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**EFFECTS OF TIMBER HARVESTING METHODS
ON TERRESTRIAL LICHENS AND UNDERSTORY
PLANTS IN WEST-CENTRAL ALBERTA**

by

Kenneth A. Kranrod



A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of
the requirements for the degree of MASTER OF SCIENCE

in

Environmental Biology and Ecology
Department of Biological Sciences

Edmonton, Alberta

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University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled EFFECTS OF TIMBER HARVESTING METHODS ON TERRESTRIAL LICHENS AND UNDERSTORY PLANTS IN WEST-CENTRAL ALBERTA by Kenneth A. Kranrod in partial fulfillment of the requirements for the degree of Master of Science in Environmental Biology and Ecology.

Abstract

This study examined the short-term effects of mechanical damage by various timber harvesting methods in woodland caribou habitat of west-central Alberta. Treatments consisted of combinations of a) summer or winter harvest, b) stump-side or road-side delimbing, and c) presence or absence of scarification. Terrestrial lichens, shrubs, herbaceous plants and terrestrial bryophytes were sampled prior to and immediately following timber harvest. All species decreased in abundance following all treatment combinations. Summer logging and scarification were primarily responsible for observed decreases. Results were influenced to a lesser extent by the method of delimbing. The greatest reductions in lichen and plant communities were observed following summer logging and stump-side delimbing with scarification. This treatment combination resulted in greater amounts of heavy machinery traffic on-site and increased disturbance of the ground surface. The smallest reductions in lichen and plant communities were observed following winter logging and stump-side delimbing without scarification. This treatment combination resulted in less ground disturbance from lower amounts of heavy machinery traffic on-site. Slash piles produced by this treatment may have provided suitable microhabitats for terrestrial lichens. These results suggest that a combination of winter timber harvest and on-site processing of trees without scarification will retain the greatest abundance of terrestrial forage for woodland caribou immediately following timber harvest in this region.

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General Introduction

Studies have shown that the diet of woodland caribou consists primarily of arboreal and terrestrial lichens (Ahti, 1961; Edwards and Ritchey, 1960; Scotter, 1962; 1964; 1967; Bergerud, 1972; Ahti *et al.*, 1973; Moser *et al.*, 1979; Thomas & Hervieux, 1986; Thomas & Barry, 1991; Thomas & Kiliaan, 1991; Staaland *et al.*, 1993). Terrestrial species form the bulk of the caribou winter diet and are consumed to a lesser extent during the summer months (Thomas & McCourt, 1981; Edmonds & Bloomfield, 1984; Thomas & Hervieux, 1986; Thomas & Barry, 1991; Thomas, 1994). During the summer, caribou increase the amount of foraging on more nutritious plants including shrubs, herbaceous plants and bryophytes (Cringan, 1957; Bergerud & Russell, 1964; Ahti & Hepburn, 1967; Bergerud, 1974; Thomas & Hervieux, 1986; Thomas, 1994; Thomas *et al.*, in press).

The impact of timber harvest on northern woodlands and associated lichen and understory plant species is of importance to forest managers and wildlife biologists concerned with the preservation of endemic caribou populations. The extent to which lichen and plant communities are affected depends upon the nature of the sites as well as the type of logging practice employed (Brumelis & Carleton, 1989; Harris, 1992). Differences in the revegetation of logged sites are often associated with the degree of logging disturbance including such factors as season of harvest and degree of scarification (Corns & La Roi, 1976; Brumelis & Carleton, 1989; Enns, 1992; Snyder & Woodard, 1992). Understanding the differences among various logging methods and the subsequent impact on lichen and plant communities is of importance for the management of year-round forage availability in woodland caribou habitat.

Recent studies have examined the effects of logging operations on lichen and plant communities, but were usually limited to examining vegetation recovery following timber harvest disturbances in general (Corns & La Roi, 1976; Abrams & Dickmann, 1982; Helle *et al.*, 1983; Kupiainen & Nieminen, 1985; Söderström, 1988; Brumelis & Carleton, 1989; Lesica *et al.*, 1991; Harris, 1992; Nieppola, 1992; Snyder & Woodard, 1992; Armleder & Stevenson, 1994; Thomas & Armbruster, 1996). Few studies have incorporated the collection of baseline or pre-disturbance data for harvested sites which provides important

information for determining the effects of logging on vegetation (Enns, 1992). As a result, forest management decision which attempt to incorporate the considerations of both forestry and maintenance of caribou habitat, lack specific recommendations for appropriate timber harvest practices at an operational level.

This study was undertaken as a result of concerns over the initiation of large scale timber harvest on the remaining winter range of woodland caribou in the foothills of west-central Alberta (Edmonds & Bloomfield, 1984; Edmonds, 1988; Thomas *et al.*, in press). The purpose of this study was to examine the short-term effects of various timber harvesting operations and to identify logging methods that reduce mechanical damage to terrestrial lichens and understory plant communities present in woodland caribou habitat. The following four hypotheses were examined.

- H₁ Post-harvest abundance will be lower than pre-harvest abundance for all treated sites.** All treatment combinations involve machinery traffic on-site during timber harvest. Through direct mechanical damage, the abundance of terrestrial lichens and understory plants will be reduced.
- H₂ Summer harvest will result in greater decreases in abundance than winter harvest, regardless of treatment combination tested.** Summer harvest involves heavy machinery traffic on-site during snow-free conditions resulting in ground disturbance and greater damage to terrestrial lichens and understory plants. During the winter, machinery travels on top of a snowpack which reduces physical contact at ground level and decreases damage to surface vegetation.
- H₃ Scarification will result in greater decreases in abundance than no scarification, regardless of treatment combination tested.** Scarification involves additional machinery traffic on-site during snow-free conditions in the spring. Disturbance of terrestrial lichens and understory plants is increased when this practice is conducted.

H₄ Stump-side delimbing will result in greater decreases in abundance than road-side delimbing, regardless of treatment combination tested. Road-side delimbing takes place off-site and requires no additional machinery. Stump-side delimbing involves the addition of a mechanical delimbing machine on-site. This practice results in additional traffic and woody debris left on-site which increases ground disturbance and damage to terrestrial lichens and understory plants.

Chapter 1 examines the effects of timber harvesting methods on the following terrestrial lichen groups:

- Lichens in total
- *Cladina* species
- *Cladonia* species
- *Peltigera* species
- *Stereocaulon* species
- *Cetraria* species
- Non-reindeer lichens

Chapter 2 covers the effects of timber harvesting methods on the following vascular and non-vascular plant groups:

- Tall and dwarf shrubs
- Herbaceous plants
- Terrestrial bryophytes

Based on this information, recommendations were developed for timber harvesting methods that reduce mechanical damage to the ground surface and thereby increase the short-term retention of important forage species in woodland caribou habitat of west-central Alberta.

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Chapter 1

Effects of Timber Harvesting Methods on Terrestrial Lichens

1.1) Introduction

Lichens are major food sources for reindeer in northern Eurasia and caribou in North America (Ahti, 1959; 1961; Edwards and Ritchey, 1960; Scotter, 1962; 1964; 1967; Bergerud, 1972; Ahti *et al.*, 1973; Moser *et al.*, 1979; Thomas & Kiliaan, 1991; Staaland *et al.*, 1993). Lichens are important in the diet of tundra-dwelling, barren-ground caribou populations and are equally or more essential for woodland caribou in forested habitats (Thomas & Hervieux, 1986; Thomas & Barry, 1991).

Although lichens are an energy source high in carbohydrates, they provide poor nourishment in proteins, fats, vitamins and minerals (Hustich, 1951; Scotter, 1965; 1972; Thomas & Kroeger, 1981; Klein, 1982; Thomas *et al.*, 1984; Nieminen & Heiskari, 1989). Owing to their low nutritive qualities, lichens comprise only a small portion of the caribou diet in spring and summer. During these months more nutritious vascular plants are consumed, including sedges, grasses, forbs and shrubs (Cringan, 1957; Bergerud & Russell, 1964; Ahti & Hepburn, 1967; Bergerud & Nolan, 1970). In the fall and winter, when vascular forage diminishes, lichen consumption increases dramatically to constitute the bulk of the caribou diet (Thomas & McCourt, 1981). Winter diets are nutritionally supplemented with relatively small amounts of evergreen shrubs and bryophytes as well as forbs and grasses with wintergreen foliage (Cringan, 1957; Bergerud & Russell, 1964; Ahti & Hepburn, 1967; Bergerud, 1974a; Thomas & Hervieux, 1986; Thomas, 1994).

Although the nutritive value of arboreal lichens has been reported to be considerably higher than that of ground lichens, epiphytic species are eaten only when access to terrestrial species is limited by very deep or hard-crusting snowpack conditions (Cringan, 1957; Edwards and Ritchey, 1960; Edwards *et al.*, 1960; Ahti, 1962; Ahti & Hepburn, 1967; Fancy & White, 1985). Thus, during the fall and winter months, woodland caribou feed selectively on terrestrial lichens which form the majority of their winter lichen intake (Edmonds & Bloomfield, 1984; Thomas *et al.*, in press; Thomas, 1994). Woodland caribou appear to feed selectively on terrestrial lichens, especially

species of the genus *Cladina*, commonly referred to as 'reindeer lichens' (Holleman & Luick, 1977; Holleman *et al.*, 1979; Thomas, 1994; Thomas & Barry, 1991). Other lichens typically consumed by woodland caribou include species of *Cetraria*, *Cladonia*, *Peltigera* and *Stereocaulon* and are often collectively referred to as reindeer or caribou lichens (Cringan, 1957; Ahti & Hepburn, 1967; Bergerud, 1971; Thomas, 1994).

Stand age is an important factor in determining the heterogeneity of both arboreal and terrestrial lichen communities (Scotter, 1963; Adams & Risser, 1971; McCune & Antos, 1982; Larson, 1984; Lesica, *et al.*, 1991; Gustafsson *et al.*, 1992; Hyvärinen *et al.*, 1992; Berg *et al.*, 1994; Crites, 1995). Lichens are poikilohydric and as such are influenced by environmental changes that are often less important to higher plants (Canter *et al.*, 1991). The effect of forest characteristics on ground surface illumination, temperature and evaporation provide numerous microhabitats suitable for a variety of lichen species (Kershaw & Rouse, 1971; Lechowicz & Adams, 1974b; Kershaw & Field, 1975; Kershaw & MacFarlane, 1980; MacFarlane & Kershaw, 1980). Both abundance and diversity of lichens have been correlated with the variety of microhabitats provided by old-growth forests (Lambert & Maycock, 1968; McCune & Antos, 1981; 1982; Söderström, 1988; Canter *et al.*, 1991; Selva, 1994). The close relationship between lichens and old-growth forests provides habitat suitable for woodland caribou populations during winter months (Husitch, 1951; Ahti, 1964; Euler *et al.*, 1976; Freddy, 1979; Fuller & Keith, 1981; Oksanen and Ahti, 1982; Helle *et al.*, 1983; Boonstra & Sinclair, 1984; Bergerud & Elliot, 1986; Cumming & Beange, 1987; Rominger & Oldemeyer, 1989; Servheen & Lyon, 1989; Seip, 1992).

The ecology of northern forests is dependent upon natural fire events which influence forest structure, nutrient recycling rates and vegetative productivity (Ahlgren & Ahlgren, 1960; Johnson, 1981). Accumulations of arboreal and terrestrial lichens are generally characteristic of the later successional stages of post-fire sequences (Bergerud, 1971; Viereck, 1973; Lechowicz & Adams, 1974a; Johnson & Rowe, 1975; Yarranton, 1975; Maikawa & Kershaw, 1976; Rouse, 1976; Zackrisson, 1977; Morneau & Payette, 1989; Thomas *et al.*, 1996). In recent years, the natural regeneration of northern forests by fire has been increasingly replaced by commercial forestry operations. Although timber

harvest practices create large disturbances, the effects of logging differ greatly from fire, and can affect woodland caribou populations in ways beyond the removal of trees (Bergerud, 1974b; Kupiainen & Nieminen, 1985; Cumming, 1992; Ferguson & Gauthier, 1992). The effects of logging practices on terrestrial lichen communities and the subsequent direct impact on endemic woodland caribou populations has become an important management consideration as lichen woodlands come under pressure for timber harvest.

Until recently, biologists and foresters concerned with the maintenance of terrestrial lichen populations have relied primarily on the results of post-fire studies (Bergerud, 1971; Corns & La Roi, 1976; Maikawa & Kershaw, 1976; Klein, 1982; Snyder, 1987; Snyder & Woodard, 1992). Since stands often do not revegetate in the same manner following fire as they do following timber harvest, post-fire studies are of limited usefulness in addressing specific lichen-related forestry issues (Abrams & Dickmann, 1982; Enns, 1992; Harris, 1992; Thomas & Armbruster, 1996). Recent post-logging studies have provided more appropriate information but were usually limited to examining lichen regeneration following timber harvest disturbance in general (Helle et al, 1983; Söderström, 1988; Brumelis & Carleton, 1989; Lesica *et al.*, 1991; Nieppola, 1992). Few studies have examined the effects of specific logging practices (Snyder, 1987; Harris, 1992; Snyder & Woodard, 1992; Armleder & Stevenson, 1994; Thomas & Armbruster, 1996) and still fewer have incorporated collection of baseline or pre-disturbance information for harvested sites (Enns, 1992). As a result, forest management decisions which attempt to incorporate the considerations of both forestry and maintenance of caribou habitat, lack specific recommendations for appropriate timber harvest practices at an operational level.

The detrimental effects of commercial forestry operations on lichen communities may occur as a result of direct damage to the lichen thalli from factors such as large machinery traffic or the skidding of logs across the ground surface (Enns, 1992; Harris, 1992). Such immediate physical damage is important in assessing the short-term impact of logging practices on lichens. Indirect effects may also occur through changes in ground-level microclimatic conditions resulting from the opening of the forest canopy (Enns,

1992; Harris, 1992). Micro-environmental changes include greater diurnal fluctuations in temperature, increased light levels, and higher wind speeds, which ultimately result in increased desiccation at ground level. These effects can occur immediately following harvest and remain significant factors affecting lichen growth over a much longer time. Owing to the direct and indirect impacts of current timber harvesting methods on terrestrial lichens, there is a need to know which practices cause the most disturbance to lichen communities in order to reduce the impact of logging operations in caribou habitat.

1.2) Methods

1.2.1) Study Area

The study area was located approximately 75 km north-west of the town of Hinton in the foothills of west-central Alberta, Canada (53° 40' N, 118° 20' W; Figure 1.1). The region is dominated by till-covered ridges and glaciofluvial deposits consisting of coarse-textured, well-drained sediments (Bennett et al, 1983). Soils are classified as luvisolic and brunisolic and the area has a xeric moisture regime and oligotrophic nutrient regime (Corns & Annas, 1986). All sampling sites were located within the Subalpine Ecoregion and corresponded to a lodgepole pine/black spruce/labrador tea/lichen ecosystem association (Corns & Annas, 1986). The area has previously been documented as woodland caribou habitat (Edmonds & Bloomfield, 1984).

The study area was located in even-aged pine stands of pyrogenic origin with dominant trees approximately 150 years of age. *Pinus contorta* Loudon was the dominant tree species in all sites with *Picea mariana* (Mill.) BSP. and *Abies lasiocarpa* (Hook.) Nutt. present in small amounts in the understory. Common shrubs included *Betula glandulosa* Michx. and *Ledum groenlandicum* Oeder, as well as an abundance of dwarf species including *Arctostaphylos uva-ursi* (L.) Spreng., *Empetrum nigrum* L., *Linnaea borealis* L., *Vaccinium caespitosum* Michx. and *Vaccinium vitis-idaea* L. Ground layer vegetation in relatively moist areas such as depressions and slope bases, was dominated by the mosses *Dicranum fuscescens* Turn., *Hylocomium splendens* (Hedw.) Schimp., *Pleurozium schreberi* (Brid.) Mitt., *Polytrichum juniperinum* Hedw. and *Ptilium crista-castrensis* (Hedw.) De Not. Ridge tops and other relatively drier sites were largely

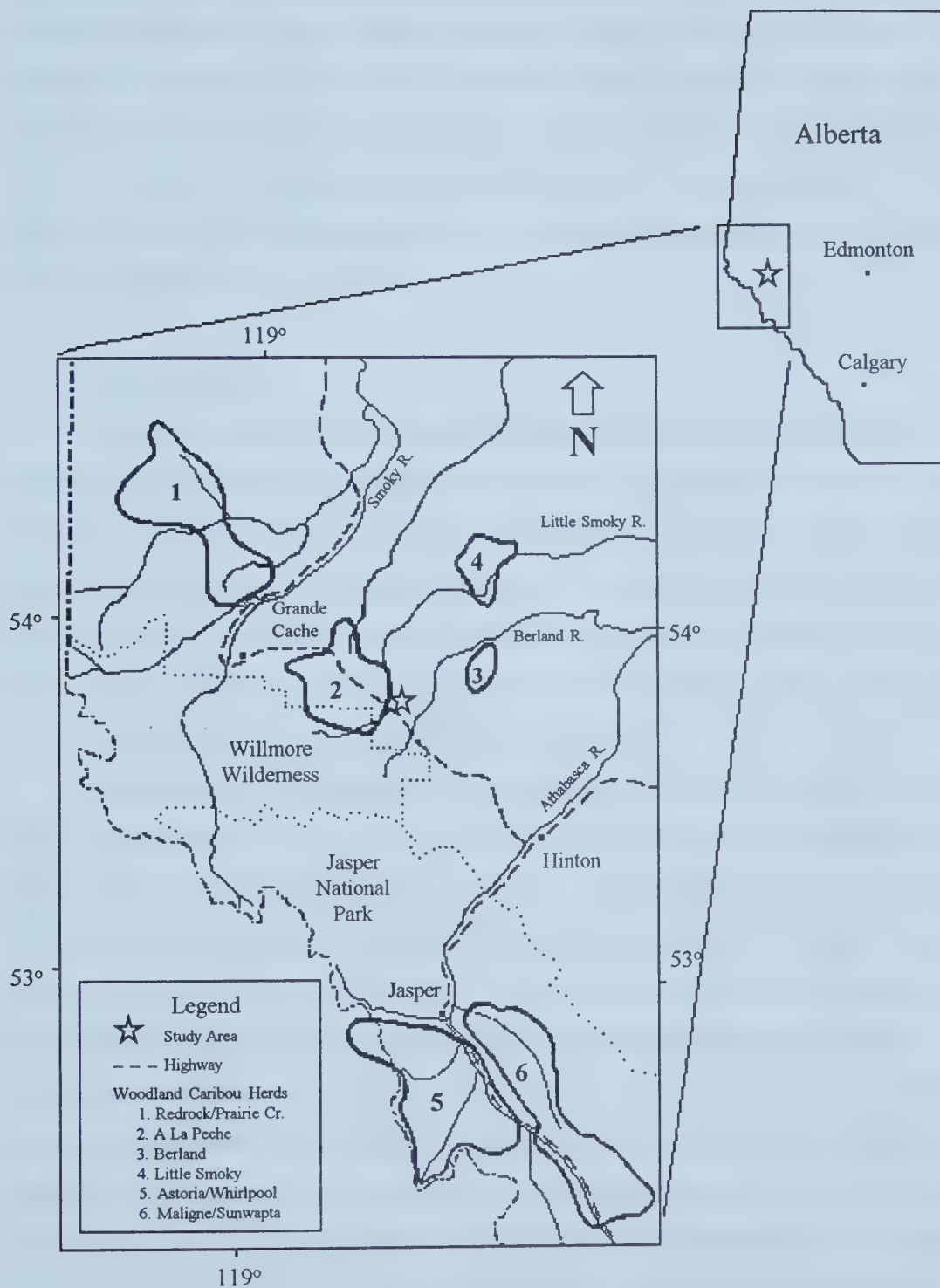


Figure 1.1 Study Area Location

vegetated by lichens including *Cetraria ericetorum* Opiz., *Cladina mitis* (Sandst.) Hustich, *Cladonia ecmocyna* Leight., *Cladonia uncialis* (L.) Wigg., *Peltigera aphthosa* (L.) Willd. and *Peltigera malacea* (Ach.) Funck. Mosses and lichens dominated the ground cover in patchy distributions governed by differences in relief. Ground layer vascular plants were low in abundance and included *Arnica cordifolia* Hook., *Cornus canadensis* L., *Elymus innovatus* Beal., *Epilobium angustifolium* L., *Oryzopsis pungens* (Torr.) A.S. Hitchc., and *Petasites palmatus* (Ait.) A. Gray.

1.2.2) Data Collection

Three forest stands were selected for the study (Figure 1.2). Stands were scheduled for timber harvest by standard clear-cut logging methods for the fall of 1994 and were each approximately 30 hectares in size. Within the proposed timber harvest boundaries (cut-blocks) of each stand, eight sample sites were selected on the basis of high lichen abundance. These areas were typically located on gravel benches and ridge tops. Four sampling sites were located outside the cut-block boundaries of each stand. These sites underwent no timber harvest and served as controls.

Each sampling site consisted of a square 30 X 30 m block divided into 20 rows and 20 columns, each 1.5m in width. Prior to the first field season, 50 of the 400 possible sample units were established within each sampling site through random number selection. This procedure was repeated independently for each sampling site. Individual sample units consisted of a 50 X 50 cm quadrat placed on the ground. Quadrats did not span entire row or column widths, which allowed for movement throughout the grid without disturbance to vegetation within the quadrat. When a tree prevented accurate quadrat placement, the quadrat was relocated to the next available position in the column. All sampling sites and sample units were set up as permanent sample plots (PSPs) and were marked in the field with metal spikes placed below ground. Detailed maps recorded exact locations of all sample sites and sample units which, combined with a metal detector, allowed for post-harvest resampling of the pre-harvest quadrats (summer, 1995) and will facilitate future re-examination of the study area.

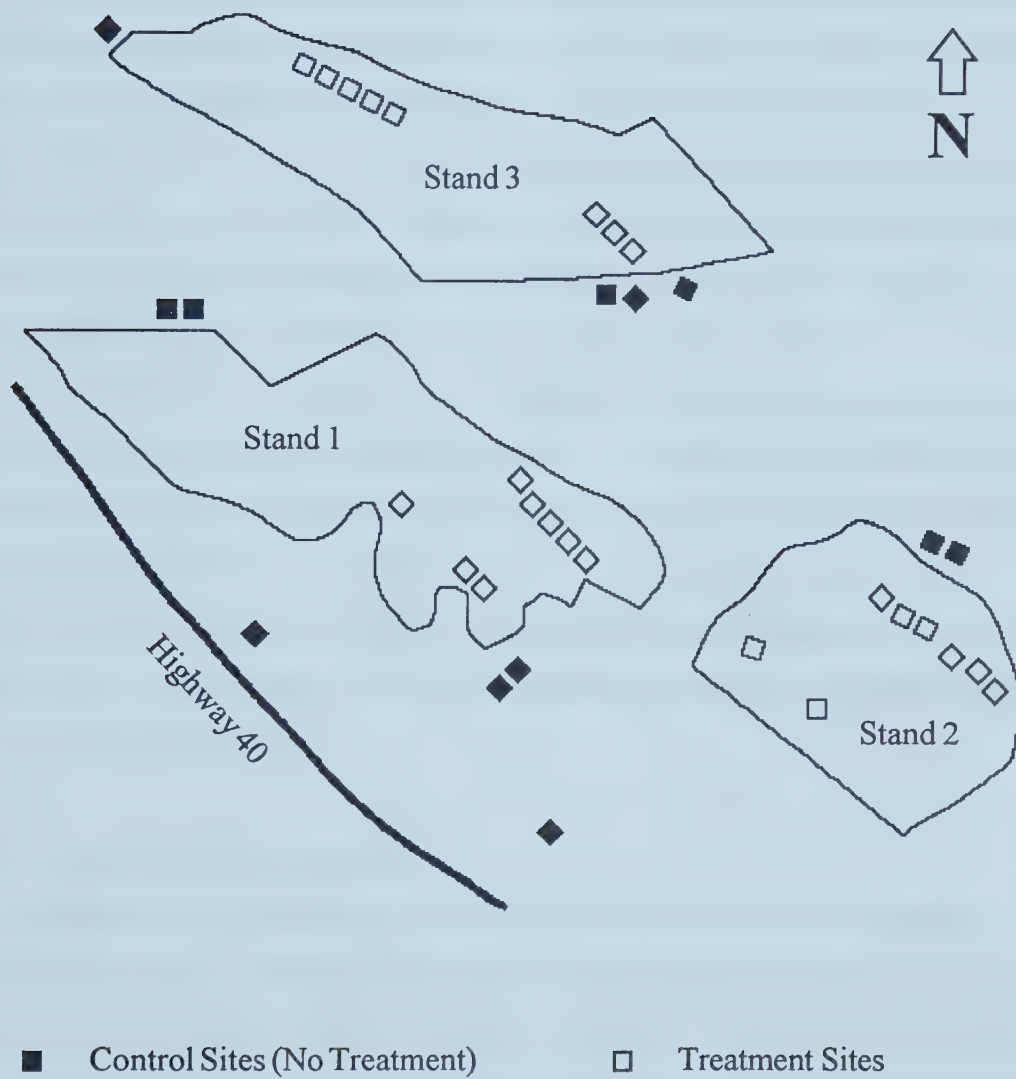


Figure 1.2 Study stands with treatment sampling sites

Initial lichen sampling and identification occurred prior to timber harvest to establish a baseline or pre-harvest dataset. All terrestrial lichen species present in each sample unit were identified and recorded in the field or collected and identified later at the University of Alberta. Terrestrial lichens included all species found growing on soil and/or downed woody material which consisted primarily of tree trunks and large branches in advanced stages of decay. Crustose lichens were not sampled since they do not constitute a portion of the woodland caribou lichen diet. Since all treatments involved clear-cut logging which resulted in the removal of the entire forest canopy, arboreal lichens were not sampled. Nomenclature follows Esslinger and Egan (1995) for terrestrial lichens. Voucher specimens were deposited and are available in the cryptogamic herbarium at the Department of Biological Sciences of the University of Alberta (ALTA).

Terrestrial lichen abundance for each sample unit was estimated using visual percent-cover classes for each species (Appendix 1.1). Lichens within sample units were not disturbed using cover estimations and, if possible, unknown specimens were taken from outside the plot so as to minimize the effects of sampling on future estimates. Sampling sites were laid out in April, 1994 and all pre-harvest sampling was conducted between May 1 and October 30, 1994. All post-harvest sampling was conducted between June 1 and August 30, 1995.

1.2.3) Timber Harvest Treatments

Application of treatments was incorporated into timber harvest operations scheduled for the area. Treatments consisted of standard logging practices that were unaltered other than being applied in specific combinations. The individual practices consisted of a) summer or winter harvest, b) stump-side or road-side delimbing, and c) presence or absence of scarification. Eight combinations of these logging techniques were examined in order to determine the differential effects of each practice in various harvesting situations as well as any possible additive effects. Each of the eight treatment combinations were assigned to separate sampling sites and replicated across all three stands. Treatments consisted of the following combinations:

- summer harvest + scarification + stump-side delimbing
- summer harvest + scarification + road-side delimbing
- summer harvest + no scarification + stump-side delimbing
- summer harvest + no scarification + road-side delimbing
- winter harvest + scarification + stump-side delimbing
- winter harvest + scarification + road-side delimbing
- winter harvest + no scarification + stump-side delimbing
- winter harvest + no scarification + road-side delimbing

Summer harvesting took place during snow-free conditions and was conducted by a Timberjack Model 618 feller-buncher. Stump-side delimbing consisted of on-site processing of trees and was conducted by a Limmit Model 2000 delimeter mounted on a Caterpillar Model 320L. This practice resulted in increased machinery traffic on the sites and large piles of woody debris deposited on-site, consisting of tree tops, branches, bark and cones, collectively referred to as slash. Slash piles were usually 1 to 5 m in diameter and approximately 1 m in height. Road-side delimbing took place off-site, required no additional machinery and left no slash piles on-site. Regardless of delimbing method performed, rubber-wheeled machines were used to drag or skid trees to a central area where trees were either mechanically chipped or cut into sections for hauling. Skidding machinery consisted of a John Deere 748E grapple skidder, a Timberjack Model 450C grapple skidder, and a Clark-Ranger Model 666 grapple skidder. Winter logging resulted in all logging machinery involved in harvesting, delimbing and skidding traveling on top of a snowpack. Snow depth varied from 15 to 45 cm at the time of the winter harvesting operations. None of the machinery appeared to penetrate the snowpack.

Scarification of the sites took place during dry conditions in the spring and involved a Komatsu Model D85E bulldozer towing a scarifying apparatus across the ground surface. The scarifying drags consisted of five metal, shark-fin barrels approximately one meter in length with a five meter length of anchor chain attached to the end of each barrel. This practice is commonly referred to as drag scarification and serves to disturb ground vegetation and expose mineral soil for planting purposes.

Logging treatments were applied individually to entire stands until specific combinations were completed. Markers as well as personal instruction directed machinery operators to ensure that the sites received appropriate treatment combinations. Machinery was directed so all sampling sites received approximately similar amounts of traffic and skid trails were not created through any sampling site.

Summer harvesting was conducted between September 8 and October 21, 1994 and winter harvesting between January 27 and February 3, 1995. Road-side delimbing treatments were performed concurrently with harvesting. Stump-side delimbing was conducted on September 20 and October 28, 1994 for summer harvested sites and on February 9 and 10, 1995 for winter harvested sites. Scarification was conducted in all stands between June 26 and July 10, 1995.

1.2.4) Data Analysis

Pre-treatment percent cover data were subtracted from post-treatment percentages to determine changes in percent cover data following treatments for each sample unit of every site. Percent cover data were arcsine-transformed to alter the binomially distributed percentages into data with an underlying distribution increased in normality. For each sample unit, percent-cover differences of lichen species were added together to form seven different groupings including total lichens, *Cetraria* species, *Cladina* species, *Cladonia* species, *Peltigera* species, *Stereocaulon* species and 'non-reindeer lichens'. These data were used for all statistical analyses.

The above genera were analyzed individually due to the disparity between authors on what constitutes 'reindeer lichen' (Thomas, 1994). By individually examining the major genera of lichen preferred by caribou, wildlife biologists and forest managers can make use of results for the appropriate lichen genera present in their particular areas. For the purposes of this study, all of the above genera will be referred to collectively as 'reindeer lichens'. The *Cetraria* group included species of the genera *Cetraria* and *Flavocetraria*. The group of 'non-reindeer lichens' included the genera *Dactylina*, *Nephroma*, *Pertusaria*, and *Solorina*. Lichens were analyzed as a total group to examine the effects of timber harvesting methods on lichens in general.

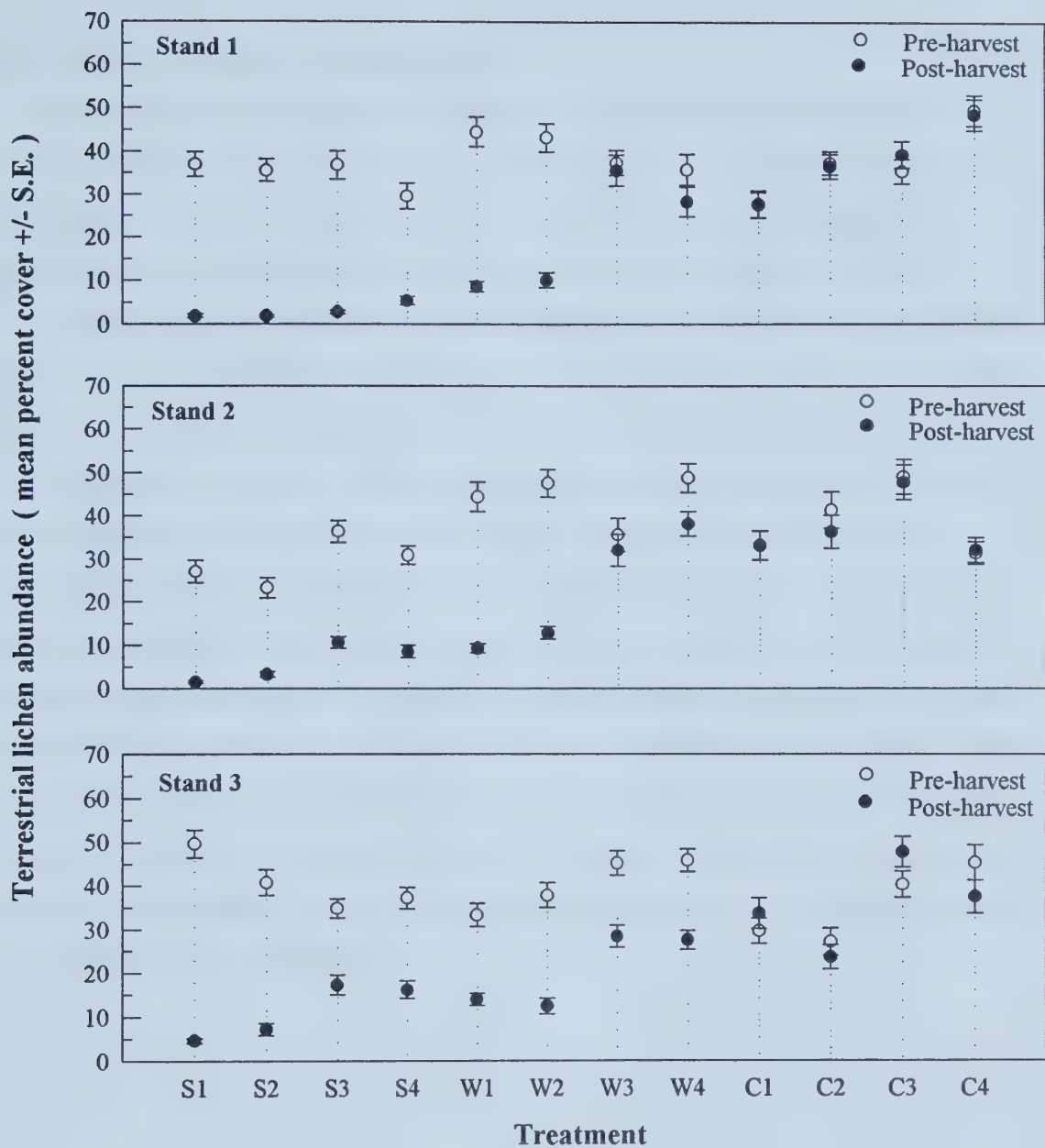
Pairwise comparisons (paired-sample t-test, Zar, 1984) were performed on a per sample unit basis to determine significant differences between pre- and post-treatment periods within each treatment sampling site. Multiple comparisons (one-way analysis of variance (ANOVA), Tukey-test, Zar, 1984) were performed to determine differences between treatments. For each lichen group in which differences were observed between treatments and controls, a three-way analysis of variance (three-way ANOVA, Sokal & Rohlf, 1981) was performed. Results of the three-way ANOVA were used to determine the differential effects of the three factors examined in the study, namely scarification, delimbing and season of timber harvest as well as any interactions that may have occurred among factors. The level of significance was set at $\alpha = 0.05$ for all statistical analyses.

1.3) Results

1.3.1) Treatment effects on terrestrial lichens

Six of the twelve control sites indicated no significant difference in lichen abundance between field seasons (pairwise t-test, $p < 0.05$; Figure 1.3; Appendices 1.2-1.4). All treatment sites, except W3 in stand 1, showed significant reductions in lichen cover following logging treatments (pairwise t-test, $p < 0.05$).

Multiple comparison results indicated similarity among control sites with no particular pattern of grouping evident for treatment sites (one-way ANOVA, Tukey-test, $p < 0.05$). Results of a three-way ANOVA indicated that scarification (all three stands) and season of harvest (two of three stands) were significant factors responsible for the differences observed among various treatment combinations ($p < 0.05$; Appendix 1.5). Treatments with scarification resulted in less lichen cover remaining than comparable treatments without scarification and sites harvested in the summer showed a greater loss of lichen cover than comparable treatment sites harvested during the winter. There was a significant first-order interaction (all three stands) between season of harvest and scarification ($p < 0.05$). No significant second-order interactions were indicated.



Treatment Legend:

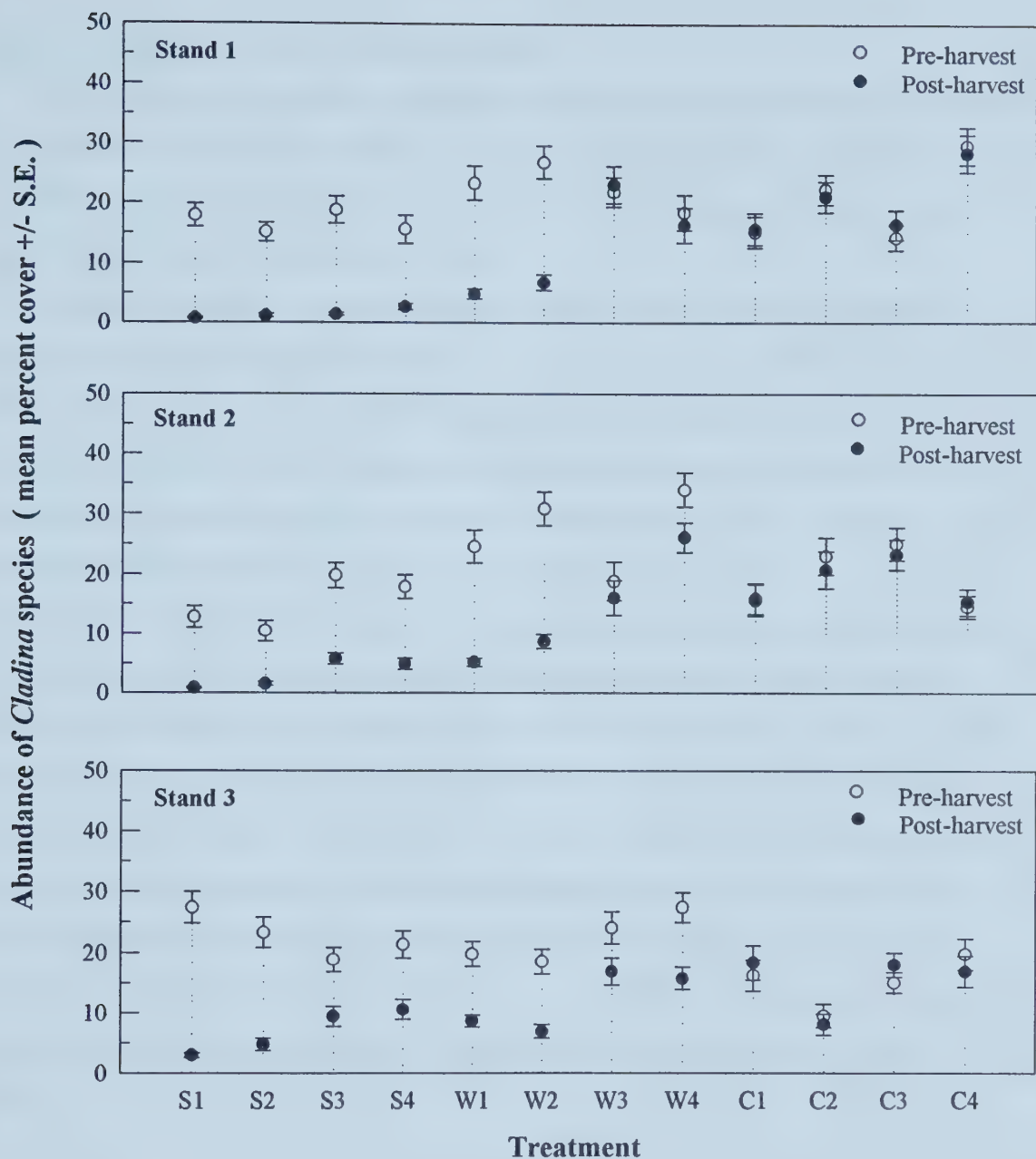
- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 1.3 Pre- and post-harvest abundances of terrestrial lichens for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

1.3.2) Treatment effects on *Cladina* species

Eight of the twelve control sites indicated no significant difference in lichen abundance between years (pairwise t-test, $p < 0.05$; Figure 1.4; Appendices 1.6-1.8). All treatment sites, except W4 in stand 1 and W3 in stands 1 and 2, showed significant reductions in lichen cover following logging treatments (pairwise t-test, $p < 0.05$).

Multiple comparison results indicated similarity among controls with no particular pattern of grouping evident for treatment sites (one-way ANOVA, Tukey-test, $p < 0.05$). Differences were observed between control sites as a whole and treatment sites ($p < 0.05$). Results of a three-way ANOVA indicated that scarification (all three stands) and season of harvest (two of three stands) were significant factors responsible for the differences observed among various treatment combinations ($p < 0.05$; Appendix 1.9). Treatments with scarification resulted in less *Cladina* cover remaining than comparable treatments with no scarification performed and summer harvested sites showed a greater loss of *Cladina* cover than comparable treatment sites harvested during the winter. There was a significant first-order interaction (all three stands) between season of harvest and scarification ($p < 0.05$). A significant first-order interaction between season of harvest and method of delimbing ($p < 0.05$) was indicated by only stand 2. No significant second-order interactions were indicated.



Treatment Legend:

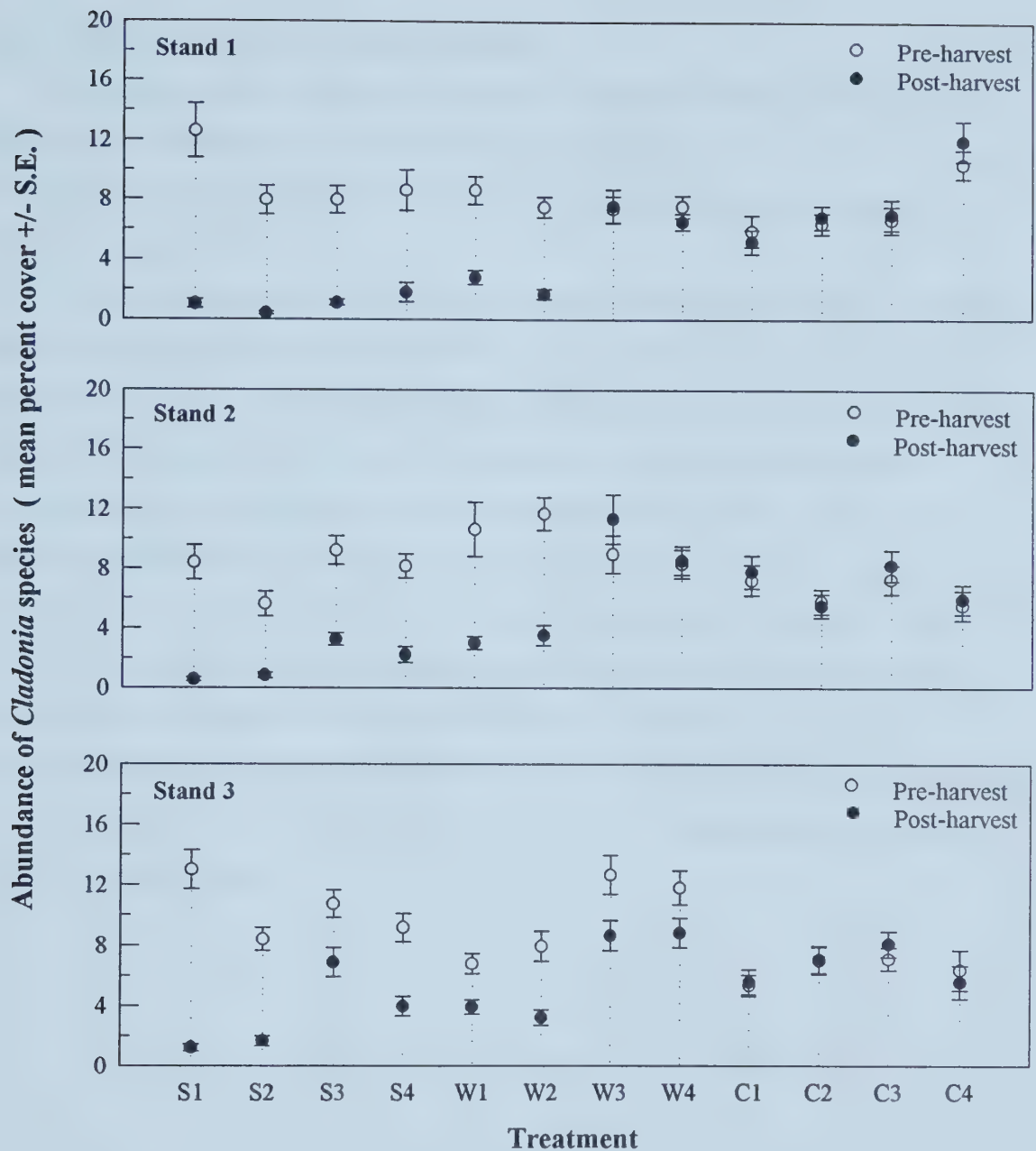
- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 1.4 Pre- and post-harvest abundances of *Cladina* species for all treatment treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

1.3.3) Treatment effects on *Cladonia* species

All control sites showed no significant difference between field seasons (pairwise t-test, $p < 0.05$; Figure 1.5; Appendices 1.10-1.12). All treatment sites, except W3 in stand 1 and W4 in stands 1 and 2 showed significant reductions in lichen cover following logging treatments (pairwise t-test, $p < 0.05$).

Multiple comparison results indicated similarity among control sites with no particular pattern of grouping evident for treatment sites (one-way ANOVA, Tukey-test, $p < 0.05$). Results of a three-way ANOVA indicated that scarification (all three stands) and season of harvest (two of three stands) and were significant factors responsible for the differences observed among various treatment combinations ($p < 0.05$; Appendix 1.13). Treatments with scarification resulted in less *Cladonia* cover remaining than comparable treatments without scarification and sites harvested during the summer showed a greater loss of *Cladonia* cover than comparable treatment sites that were winter harvested. Delimbing was indicated as a significant factor in only one of the three stands ($p < 0.05$). Stump-side processing reduced the amount of *Cladonia* cover on-site when combined with summer harvesting and scarification. In all other treatment combinations, stump-side delimbing increased retention of *Cladonia* cover compared to identical treatments with road-side delimbing. There was a significant first-order interaction between season of harvest and scarification for two of the three stands ($p < 0.05$). A significant second-order interaction among all three factors was displayed by these same two stands ($p < 0.05$).



Treatment Legend:

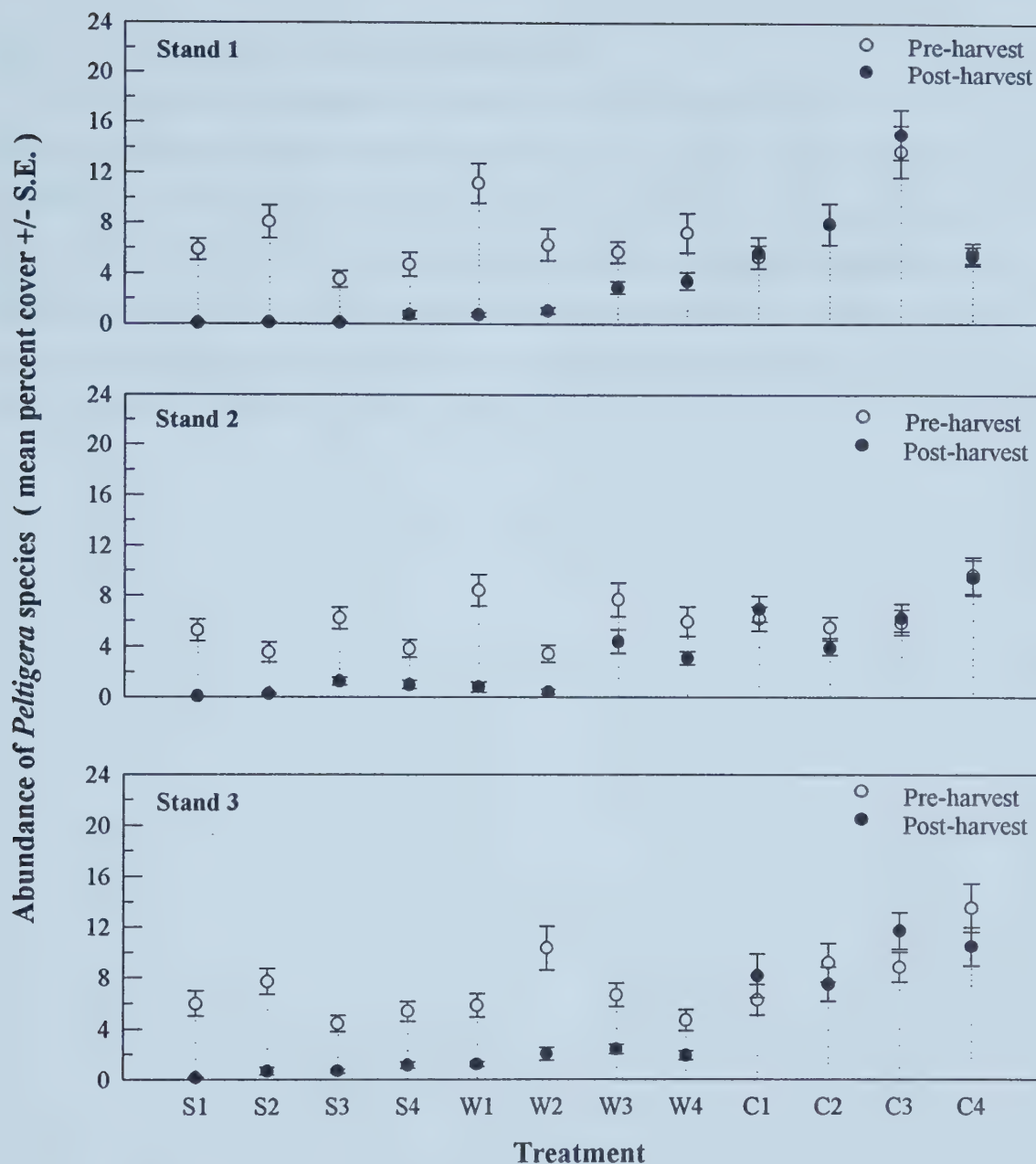
- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 1.5 Pre- and post-harvest abundances of *Cladonia* species for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

1.3.4) Treatment effects on *Peltigera* species

Nine of the twelve control sites indicated no significant difference in lichen cover between years (pairwise t-test, $p < 0.05$; Figure 1.6; Appendices 1.14-1.16). All treatment sites displayed significant reductions in lichen cover following logging treatments (pairwise t-test, $p < 0.05$).

Multiple comparison results indicated similarity among controls with no particular pattern of grouping evident for treatment sites (one-way ANOVA, Tukey-test; $p < 0.05$). Results of a three-way ANOVA indicated that scarification (two of three stands) was a significant factor responsible for the differences observed among various treatment combinations ($p < 0.05$; Appendix 1.17). Treatments with scarification resulted in less *Peltigera* cover remaining than comparable treatments with no scarification performed. Delimbing was shown as a significant factor in only one of the three stands ($p < 0.05$). Stump-side processing decreased the amount of *Peltigera* cover left on all sites except when combined with winter harvest and no scarification. Significant first-order interactions between season of harvest and delimbing as well as scarification and delimbing were indicated by only one stand in each case ($p < 0.05$). No significant second order interactions were indicated.



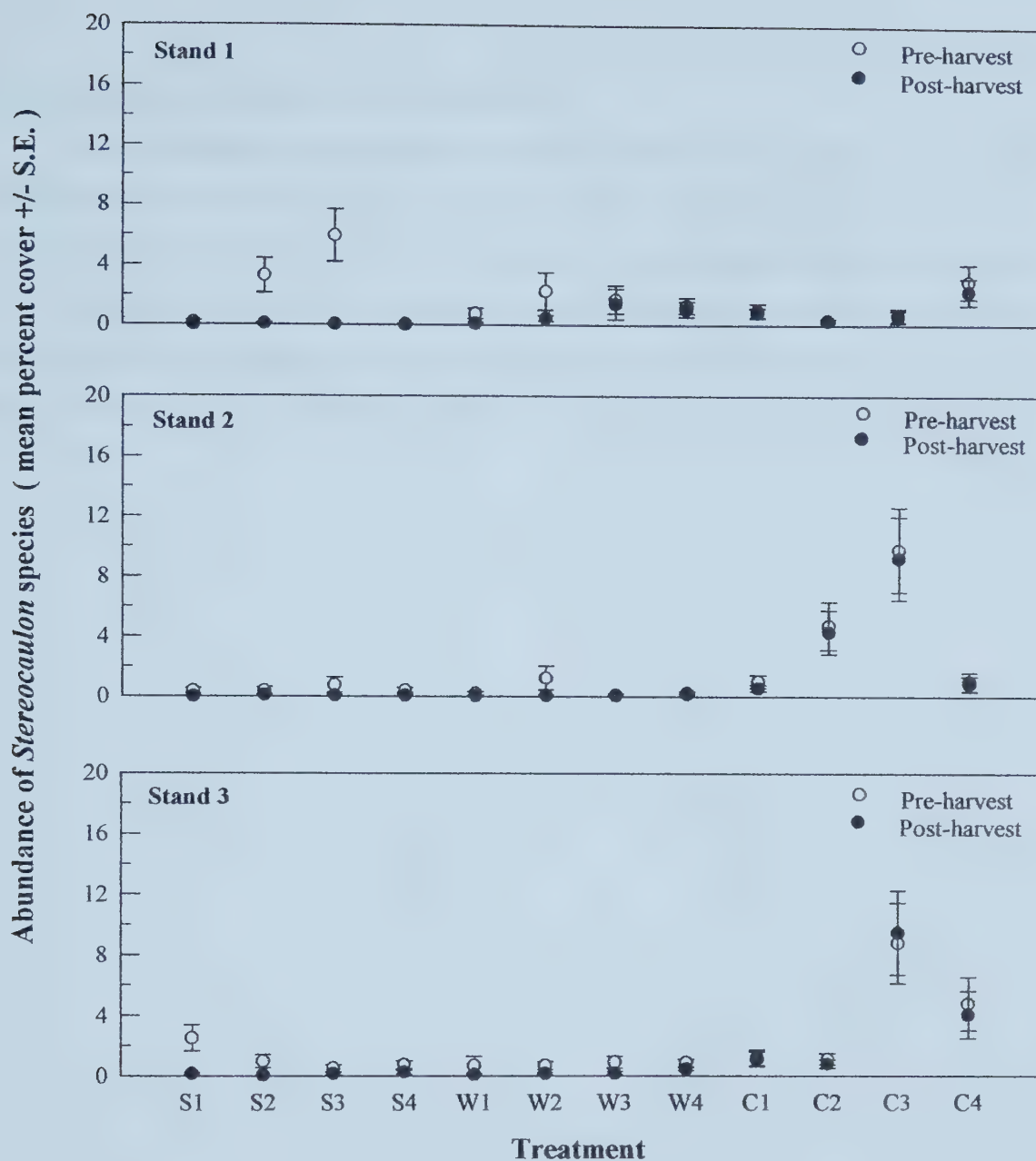
Treatment Legend:

- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 1.6 Pre- and post-harvest abundances of *Peltigera* species for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

1.3.5) Treatment effects on *Stereocaulon* species

All control and treatment sites, except S2 and S3 in stand 1 and S1 in stand 3, showed no significant differences between years (pairwise t-test, $p < 0.05$; Figure 1.7; Appendices 1.18-1.20). All three significant reductions consisted of summer harvested treatment sites with two of the three involving scarification. Multiple comparison results indicated a high degree of similarity among controls and treatment sites which prevented any observable grouping patterns and further analyses (one-way ANOVA, Tukey-test; $p < 0.05$). A three-way ANOVA was not performed.



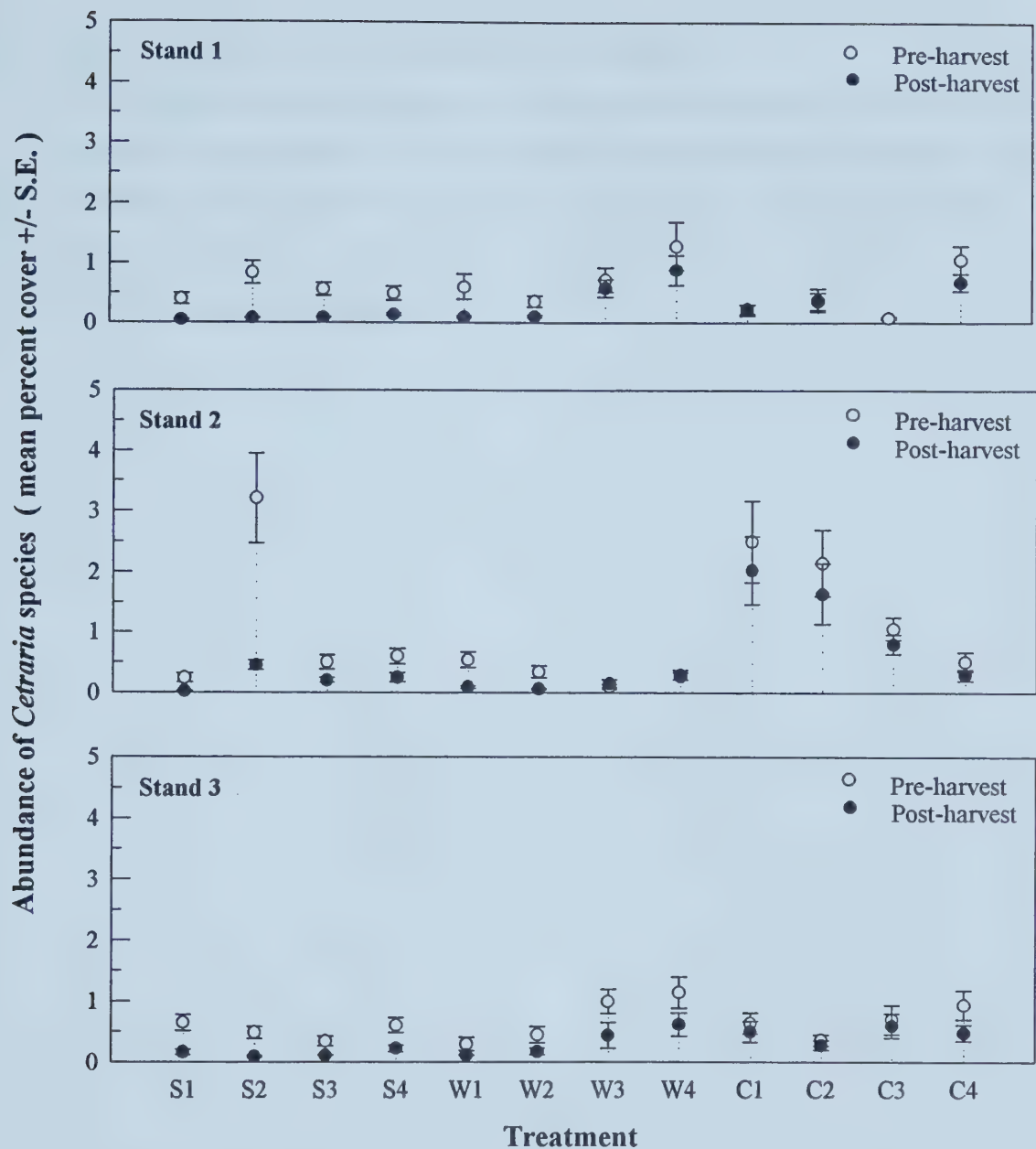
Treatment Legend:

- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 1.7 Pre- and post-harvest abundances of *Stereocaulon* species for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

1.3.6) Treatment effects on *Cetraria* species

All control and treatment sites, except S2 in stand 2 and C4 in stand 3, showed no significant differences between years (pairwise t-test, $p < 0.05$; Figure 1.8; Appendices 1.21-1.23). Treatment S2 consisted of a summer harvested treatment that was stump-side delimbed and scarified. Multiple comparison results indicated a high degree of similarity among controls and treatment sites which prevented any observable grouping patterns and further analyses (one-way ANOVA, Tukey-test; $p < 0.05$). A three-way ANOVA was not performed.



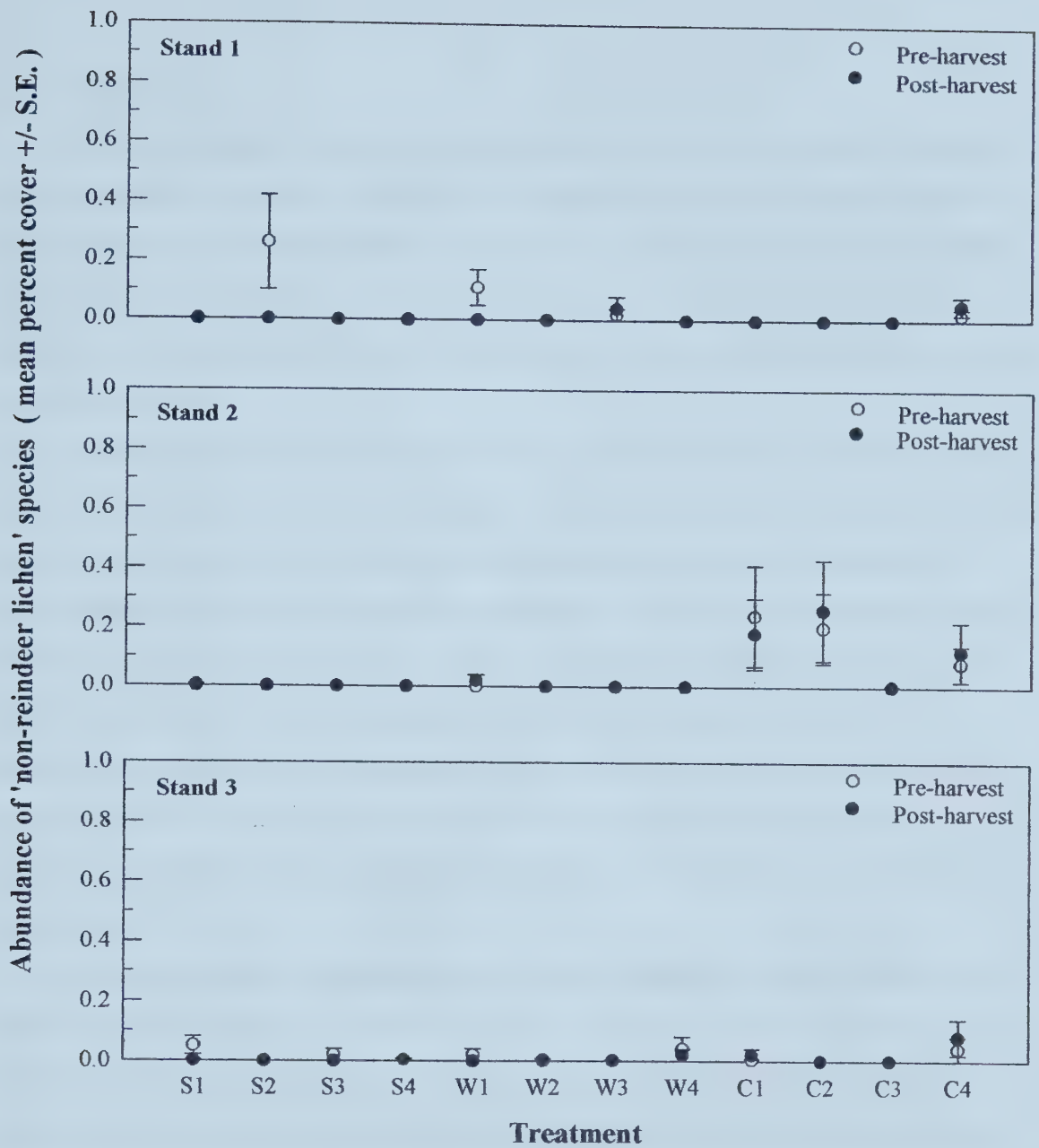
Treatment Legend:

- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 1.8 Pre- and post-harvest abundances of *Cetraria* species for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

1.3.7) Treatment effects on ‘non-reindeer lichen’ species

All sampling sites showed no significant differences between years (pairwise t-test, $p < 0.05$; Figure 1.9; Appendices 1.24-1.26). Multiple comparison results indicated a high degree of similarity among controls and treatment sites which prevented any observable grouping patterns and further analyses (one-way ANOVA, Tukey-test; $p < 0.05$). A three-way ANOVA was not performed.



Treatment Legend:

- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 1.9 Pre- and post-harvest abundances of 'non-reindeer lichen' species for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

1.4) Discussion

The lichen genera *Stereocaulon* and *Cetraria* as well as ‘non-reindeer’ lichens did not display significant results. Extremely low abundances prevented any useful analyses and resulted in no observable trends in the data. These three lichen groups will therefore not be included in the discussion. Effects of the various treatment combinations were similar for the lichen genera *Cladina*, *Cladonia* and *Peltigera* as well as lichens considered together as a group.

All terrestrial lichens declined in abundance following logging treatments. Post-harvest lichen populations consisted primarily of common rather than rare species. Timber harvesting methods however did not appear to selectively damage particular lichen species. Higher pre-harvest covers of common lichens accounts for subsequently greater post-harvest abundances, as compared to that of rare species. Post-harvest lichen populations consisted of species that were present before logging took place. Replacement or turnover of lichen species did not occur. The short time frame of this study accounts for the absence of invading lichen species. Pre- and post-harvest abundances of individual lichen species for all treatment combinations are provided in Appendices 3.1 - 3.9.

Decreases in lichen abundance were attributed primarily to season of harvest and scarification. Delimbing was responsible for a minor portion of observed decreases. The treatment combinations of summer harvest and stump-side delimbing followed by scarification in the spring generally resulted in the greatest reduction of lichen abundance. The greatest retention of lichen cover was observed following the treatment combinations of winter harvest and stump-side delimbing with no scarification.

Season of harvest appeared to be the major factor determining the amount of disturbance to terrestrial lichen communities. Regardless of the treatment combination, summer harvesting reduced lichen abundance for all lichens to a greater degree than winter harvesting. For most sites, summer harvesting reduced original lichen communities to isolated lichen fragments. The large difference apparent between summer and winter harvest was likely attributable to the absence of a snowpack during harvesting in the summer. In the summer, lichens are vulnerable to the wheel and track traffic of heavy

machinery as well as trees that are dragged across the ground surface. This is especially true during dry periods when lichens are brittle and easily damaged. Dry conditions were present during the summer harvesting operations of this study. During wet conditions, the increased flexibility of lichens may reduce mechanical damage to some degree, however the extent of this possible moderating effect is unknown.

Lichens do not have a vascular root system like higher plants and therefore are not anchored to the ground and are easily removed. During the winter, logging machinery travels on a snowpack over frozen ground. This reduces or eliminates physical traffic at the ground level and minimizes ground surface disturbance and damage to terrestrial lichens. In the spring before scarification was conducted, terrestrial lichens in winter harvested sites often appeared as if no physical damage had been sustained from logging.

Scarification was also a major factor in determining lichen abundance following timber harvest treatments. Scarification severely damaged vegetation and disturbed the ground surface exposing large amounts of mineral soil. Lichen cover was reduced to a greater degree following all treatment combinations involving scarification as compared to similar treatments without scarification. Lichen communities in winter harvested sites were largely intact with large furrows of exposed mineral soil while lichens in summer harvested sites consisted of only scattered fragments of the original colonies. The effect of scarification was pronounced, in some sites reducing the lichen cover of winter harvested sites to a greater degree than that of non-scarified summer harvested sites.

Enns (1992) also found that drag scarification severely reduced terrestrial lichen abundance. Absence of a scarification treatment eliminated this damage. However, over a long time frame severe disturbance such as scarification may actually increase terrestrial lichen regeneration rates to equal or greater levels than that following no scarification or fire (Snyder & Woodard, 1992). Harris (1992) speculated that terrestrial lichen regeneration would be maximized following a scarification treatment that provided sufficient mineral soil exposure yet retained enough of the original lichen communities for satisfactory recolonization. The treatment combinations in this study involving winter harvesting and scarification may provide such results over the long-term.

Delimbing influenced the degree to which lichen abundance decreased, although not to the extent as either scarification or summer harvest. Stump-side delimbing in combination with summer harvesting and scarification generally caused the greatest damage to terrestrial lichens. This was likely attributable to increased machinery traffic on the site which has been previously documented for stump-side delimbing practices (Araki, 1994). In addition, stump-side delimbing generally deposited large amounts of woody debris on-site which were dragged across the ground surface of sites by the scarifier. This may have resulted in increased ground disturbance and damage to terrestrial lichens than by scarifying drags alone.

Stump-side delimbing in combination with winter harvest and followed by no scarification resulted in the greatest amount of lichen cover left on the sites. The delimbing machinery operated on a snowpack which reduced damage at the ground surface. Stump-side delimbing also left large piles of woody debris on-site. Underneath these piles, environmental extremes of temperature, light, moisture and wind present in the open cut-block were reduced. At pile edges, fluctuations in light and temperature were moderated, and combined with high moisture levels appeared to provide suitable microenvironments for lichens. Lichens present in road-side delimbed sites without cover often appeared to be suffering damage from extreme temperature and light levels as well as desiccation. Similar effects were observed for terrestrial lichens following removal of the forest canopy by logging in south-central British Columbia (Enns, 1992). Debris piles may therefore serve to maintain lichens over a short period of time following logging and possibly retain lichen populations over a much longer time frame (Harris, 1992). For this study, the abundance of terrestrial lichens is expected to continue decreasing over the next few years in response to altered microenvironmental conditions. Decreases may abate following revegetation of the sites which would ameliorate microenvironmental extremes.

1.5) Conclusion

Due to the low abundances of *Stereocaulon*, *Cetraria* and 'non-reindeer' lichens, the following conclusions are based on results from the lichen genera *Cladina*, *Cladonia* and *Peltigera* as well as terrestrial lichens as a whole. Lichens decreased in abundance

following all treatment combinations and showed similar trends for the various treatments examined. The greatest reductions in abundance of lichens were observed following the treatment combination of summer harvesting and stump-side delimbing with scarification. Data support Hypothesis 1: post-harvest abundance will be lower than pre-harvest abundance for all treated sites.

Regardless of the treatment combination, summer harvesting generally reduced lichen abundance to a greater degree than comparable treatments harvested in the winter. Data support Hypothesis 2: summer harvesting will result in greater decreases in abundance than winter harvesting, regardless of treatment combination tested.

Regardless of the treatment combination, scarification generally reduced lichen abundance to a greater degree than comparable treatments without scarification. Data support Hypothesis 3: scarification will result in greater decreases in abundance than no scarification, regardless of treatment combination tested.

Stump-side delimbing in combination with summer timber harvest and no scarification resulted in the greatest reductions in lichen cover. However, stump-side delimbing conducted during winter timber harvest without scarification retained the greatest lichen abundance. Data do not support Hypothesis 4: stump-side delimbing will result in greater decreases in abundance than road-side delimbing, regardless of treatment combination tested.

The treatment combinations of winter harvest and no scarification, whether combined with stump-side or road-side delimbing of trees, retained the highest lichen abundance of all logging treatments. This combination included treatments W3 and W4 which in some sites, retained as much or more terrestrial lichen cover as control sites. By increasing the retention of terrestrial lichens through this combination of logging practices, important lichen forage species for woodland caribou may be maintained immediately following timber harvest.

Lichens left on road-side delimbed sites with no woody debris piles for cover may have a higher probability of succumbing to environmental extremes present in the open cut-block. The slash piles provided by stump-side delimbing appear to maintain lichen abundance over the short-term. Over a longer time frame, these microhabitats may

decrease the recovery time of lichen communities by increasing the amount of terrestrial lichen retained after logging. With slash piles distributed throughout a cut-block, numerous sites are provided from which lichens can spread from and possibly recolonize the logged area in a much shorter time period.

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Chapter 2

Effects of Timber Harvesting Methods on Shrubs, Herbs and Terrestrial Bryophytes

2.1) Introduction

The boreal forest is characterized by high levels of disturbance in which rapid vegetative regeneration occurs following forest fires which then progresses through various successional stages until another fire occurrence (Ahlgren & Ahlgren, 1960; Shafi & Yarranton, 1973a; 1973b; Maikawa & Kershaw, 1976; Zackrisson, 1977; Johnson, 1981; Foster, 1985). Large-scale commercial forestry operations have replaced fire as the main form of disturbance in many areas of North America (Schoonmaker & McKee, 1988). Since periodic fire events are important to the natural cycle of woodland caribou habitat (Rowe & Scotter, 1973; Johnson & Rowe, 1975; Klein, 1982; Morneau & Payette, 1989), the impact of logging on northern woodlands is of importance to forest managers and wildlife biologists concerned with the preservation of endemic caribou populations.

Although timber harvest practices create large disturbances with characteristics that may approximate the effects of fire, post-logging recovery of vegetation has been shown to differ from regeneration following fire (Corns & La Roi, 1976; Abrams & Dickmann, 1982). Studies have documented some of the distinctive differences that exist between post-fire and post-logging regeneration of terrestrial lichens (Söderström, 1988. Harris, 1992; Snyder & Woodard, 1992). These studies have provided important information for the management of woodland caribou populations since terrestrial lichens account for the majority of caribou winter diets as well as partially for caribou summer diets (Thomas, 1994).

Other types of forage important in the woodland caribou winter diet include shrubs, herbaceous plants and terrestrial bryophytes. These plants provide essential sources of proteins and vitamins which complement lichen nutrition (Cringan, 1957; Bergerud & Russell, 1964; Ahti & Hepburn, 1967; Bergerud, 1974a; Thomas & Hervieux, 1986; Thomas, 1994). Consumption of these vascular and non-vascular plants by caribou exceeds the intake of lichens during the snowfree summer months when succulent

vegetation becomes available (Cringan, 1957; Bergerud & Russell, 1964; Ahti & Hepburn, 1967; Bergerud & Nolan).

The impact of timber harvest on understory vegetation has been previously studied (Corns & La Roi, 1976; Abrams & Dickmann, 1982; Brumelis & Carleton, 1989; Nieppola, 1992). The responses of shrub and herbaceous plant communities to logging has been shown to be highly variable, ranging from large decreases in cover and species richness to little change with increases not uncommon (Brinkman, 1936; Dyrness, 1973; Corns & La Roi, 1976; Kauppi *et al.*, 1978; Abrams & Dickmann, 1982; Kirby, 1988; Brumelis & Carleton, 1989; Nieppola, 1992; Snyder & Woodard, 1992). Bryophyte species appear to be severely affected by timber removal in general, displaying large decreases in cover following logging (Brinkman, 1936; Corns & La Roi, 1976; Nieppola, 1992). The extent to which these plant communities are affected depends upon the nature of the sites examined as well as the type of logging practice employed (Brumelis & Carleton, 1989). Differences in revegetation have often been attributed to varying levels of logging disturbance (Brumelis & Carleton, 1989). Season of logging and scarification are often two factors which decidedly change the revegetation that occurs following logging. Understanding the differences of various logging methods and the subsequent impacts on the vascular and non-vascular plant communities is of importance for management of year-round forage availability in caribou habitat.

2.2) Methods

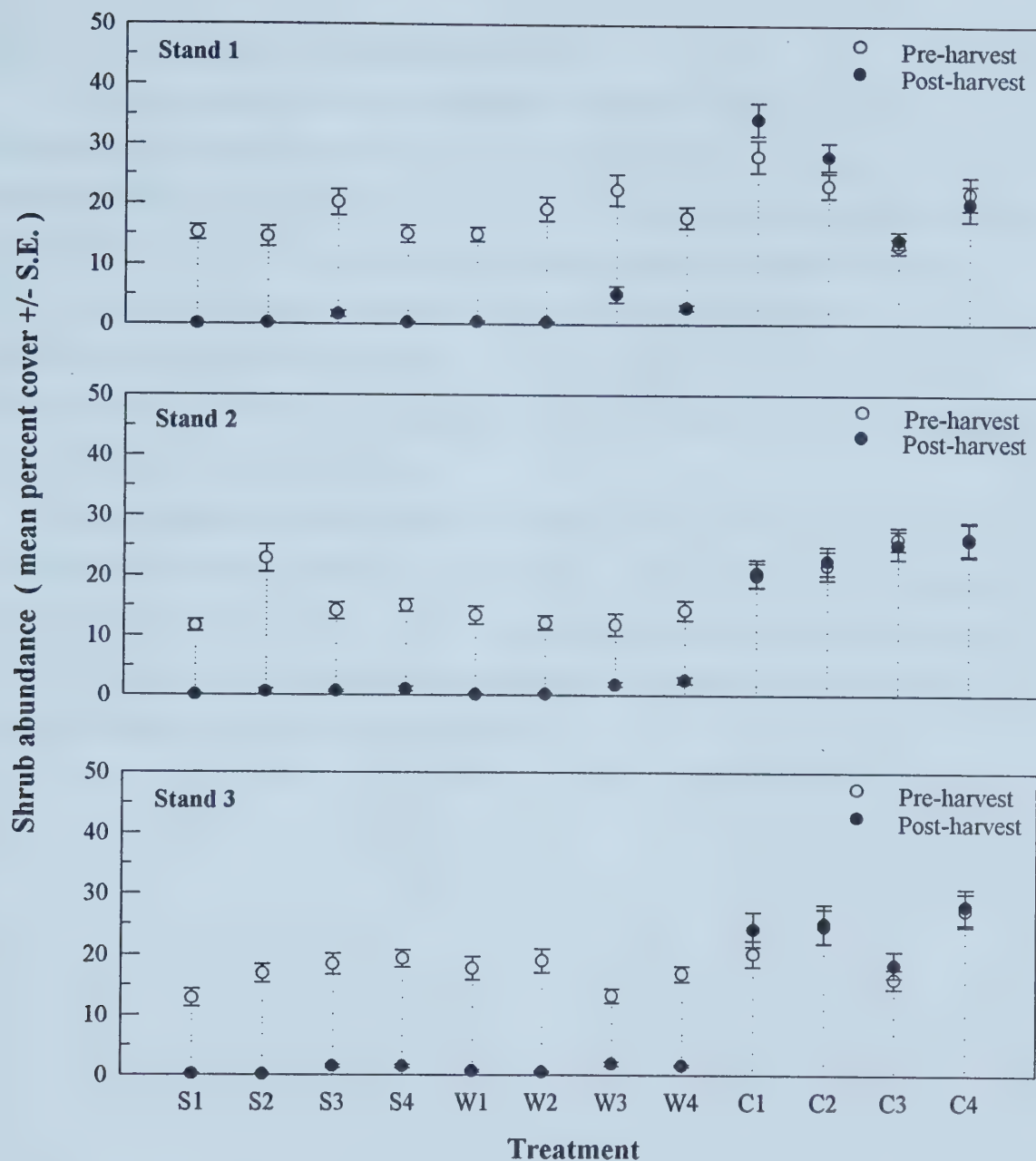
For a detailed description of the study area, timber harvest treatments and the data collection and analysis methods see section 1.2 in Chapter 1. The only differences were that species of bryophytes, shrubs and herbaceous plants were sampled rather than lichens. Nomenclature follows Anderson *et al.* (1990) for mosses, Stotler and Crandall-Stotler (1977) for liverworts and Moss (1983) for trees, shrubs, forbs, graminoids, horsetails and clubmosses. For the purposes of this study, bryophytes included all species of mosses and liverworts. Shrubs consisted of all tall shrub, dwarf shrub and trees species < 1.3 m in height. Herbaceous plants included all forb, graminoid, clubmoss and horsetail species. These data were used for all statistical analyses.

2.3) Results

2.3.1) Treatment effects on shrub species

Eight of the twelve control sites indicated no significant difference in shrub abundance between years (pairwise t-test, $p < 0.05$; Figure 2.1; Appendices 2.1-2.3). All treatment sites showed significant reductions in shrub cover following logging treatments (pairwise t-test, $p < 0.05$).

Multiple comparison results indicated similarity among control sites with no particular pattern of grouping evident for treatment sites (one-way ANOVA, Tukey-test, $p < 0.05$). Results of a three-way ANOVA indicated that method of delimbing (two of three stands) was a significant factor responsible for differences observed among various treatment combinations ($p < 0.05$; Appendix 2.4). Stump-side processing increased the amount of shrub cover left on-site for all treatment combinations except summer harvested and scarified sites in which shrub cover was less than comparable road-side delimbed sites. Season of harvest and scarification were indicated as significant factors by only one of three stands ($p < 0.05$). Sites harvested in the summer showed a greater loss of shrub cover than comparable treatments harvest during the winter and treatments with scarification resulted in less shrub cover remaining than comparable treatments without scarification. Significant first-order interactions between season of harvest and scarification, as well as season of harvest and delimbing were displayed by only one of three stands in each case ($p < 0.05$). A significant second-order interaction among all three factors was displayed by one stand ($p < 0.05$). Although not significant, controls showed little change in shrub cover compared to treatment sites.



Treatment Legend:

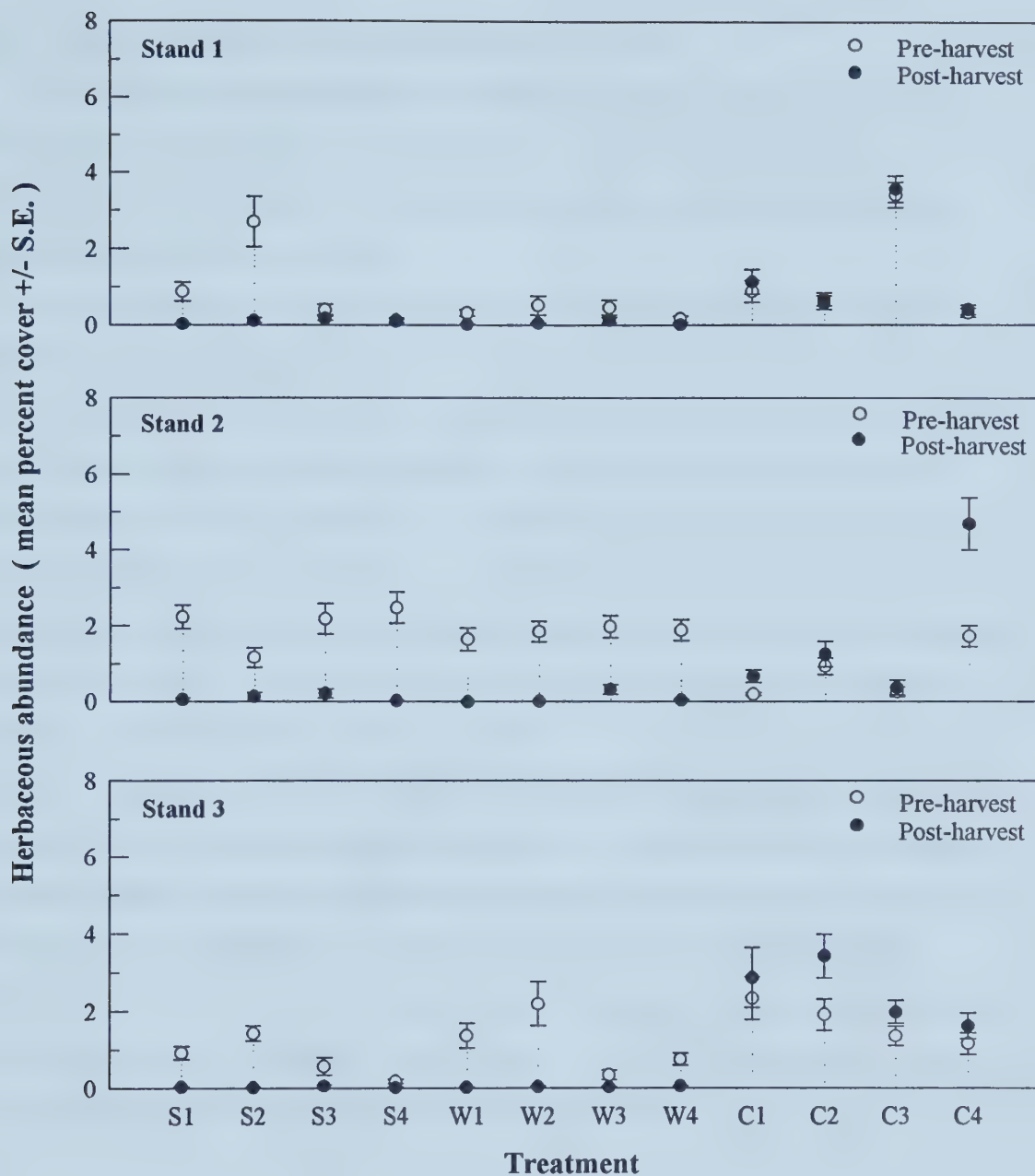
- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 2.1 Pre- and post-harvest abundances of shrub species for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

2.3.2) Treatment effects on herbaceous species

Ten of the twelve control sites indicated no significant difference in herb abundance between years (pairwise t-test, $p < 0.05$; Figure 2.2; Appendices 2.5-2.7). Treatment sites showed mixed results. In stand 1, all treatment sites except S2 showed no significant reductions in herb cover following logging treatments (pairwise t-test, $p < 0.05$). For stand 2, all treatment sites except S2 showed significant reductions in herb cover following logging treatments (pairwise t-test, $p < 0.05$). In stand 3, all treatment sites except S2 and W2 showed no significant reductions in herb cover following logging treatments (pairwise t-test, $p < 0.05$).

Multiple comparison results indicated a high degree of similarity among controls and treatment sites which prevented any observable grouping patterns and further analyses (one-way ANOVA, Tukey-test, $p < 0.05$). Significant differences in herbaceous cover occurred in only one stand. Extremely low abundances of herbaceous plants prevented any useful analyses and observable trends in the data.



Treatment Legend:

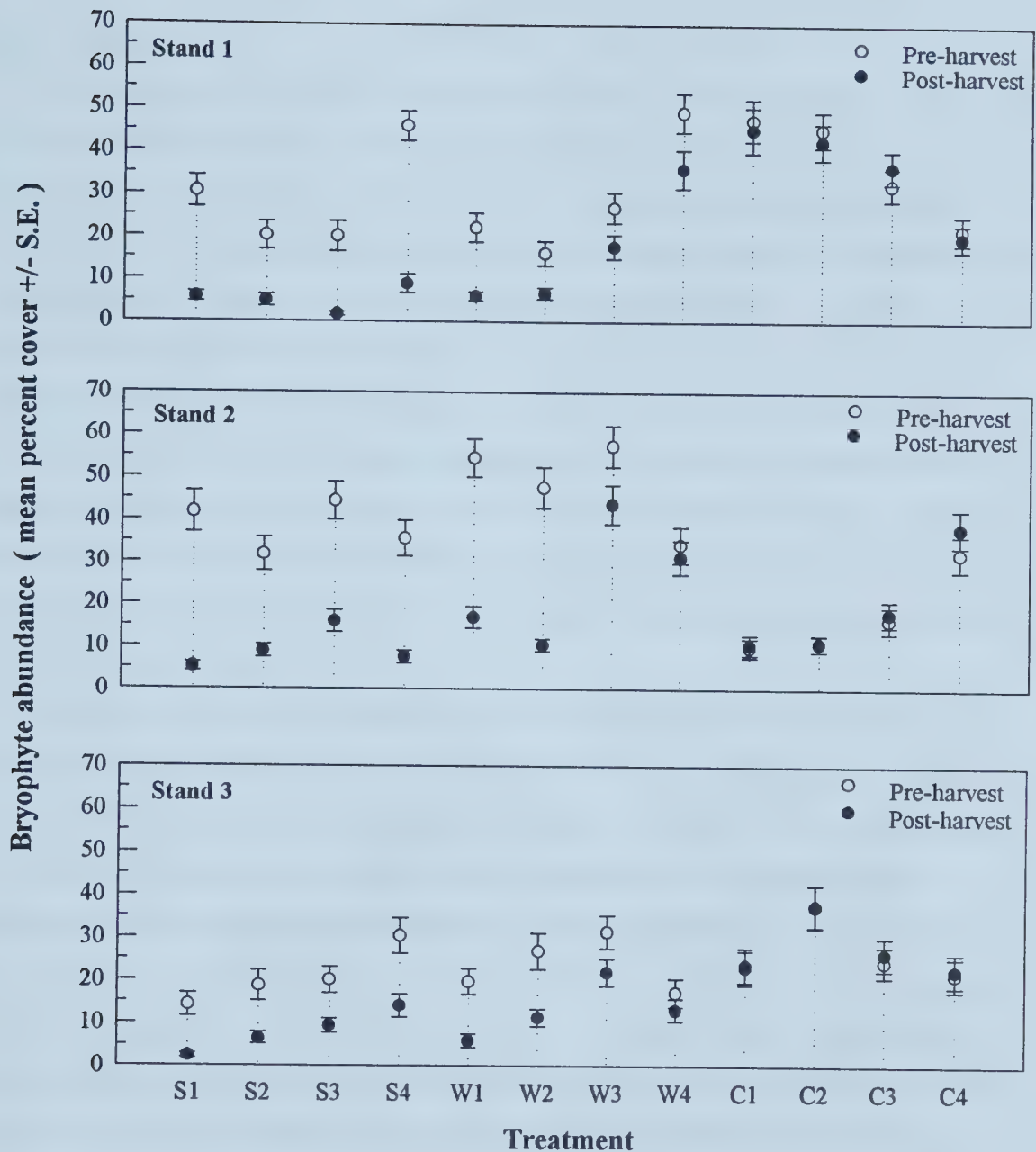
- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 2.2 Pre- and post-harvest abundances of herbaceous species for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

2.3.3) Treatment effects on terrestrial bryophyte species

Nine of the twelve control sites indicated no significant difference in bryophyte abundance between years (pairwise t-test, $p < 0.05$; Figure 2.3; Appendices 2.8-2.10). All treatment sites showed significant reductions in bryophyte cover following logging treatments (pairwise t-test, $p < 0.05$).

Multiple comparison results indicated similarity among control sites with no particular pattern of grouping evident for treatment sites (one-way ANOVA, Tukey-test, $p < 0.05$). Results of a three-way ANOVA indicated that scarification (two of three sites) was a significant factor responsible for differences observed among various treatment combinations ($p < 0.05$; Appendix 2.11). Treatments involving scarification resulted in a greater loss of bryophyte cover than comparable treatments without scarification. Season of harvest and delimbing were indicated as significant factors by only one of three stands in each case ($p < 0.05$). Summer harvested sites showed a greater loss of bryophyte cover than comparable sites harvested during the winter. Stump-side processing reduced the amount of bryophyte cover left on-site for all treatment combinations except summer harvested, non-scarified sites in which bryophyte cover was greater than comparable road-side delimbed sites. A significant first-order interaction between season of harvest and scarification was indicated by two of three stands ($p < 0.05$). Stand 1 indicated a significant first-order interaction between season of harvest and scarification as well as a second-order interaction among all three factors ($p < 0.05$). Although not significant, controls showed little change in bryophyte cover compared to treatment sites.



Treatment Legend:

- S1 - Summer harvest / Scarification / Stump-side delimbing
- S2 - Summer harvest / Scarification / Road-side delimbing
- S3 - Summer harvest / No scarification / Stump-side delimbing
- S4 - Summer harvest / No scarification / Road-side delimbing
- W1 - Winter harvest / Scarification / Stump-side delimbing
- W2 - Winter harvest / Scarification / Road-side delimbing
- W3 - Winter harvest / No scarification / Stump-side delimbing
- W4 - Winter harvest / No scarification / Road-side delimbing
- C1, C2, C3, C4 - Control Sites (No treatment)

Figure 2.3 Pre- and post-harvest abundances of bryophyte species for all treatment sampling sites of all 3 stands. ($n = 50$ for each treatment)

2.4) Discussion

Vascular plants, including shrub and herb species, appeared to differ in response to the various timber harvesting methods examined from that of the non-vascular bryophytes. Shrub and herb species displayed large decreases in abundance following all treatment combinations. Remaining vascular plant populations consisted primarily of common rather than rare species. Timber harvesting methods however did not appear to selectively damage particular plant species. Higher pre-harvest covers of common plants accounts for subsequently greater post-harvest abundances, as compared to that of rare species. Post-harvest shrub and herb populations consisted of species that were present before logging took place. Replacement or turnover of vascular species did not occur. The short time frame of this study accounts for the absence of invading species. Pre- and post-harvest abundances of individual vascular plant species for all treatment combinations are provided in Appendices 4.1 - 4.18.

Although reductions in shrub cover were primarily attributed to delimbing, shrubs appeared to decrease approximately the same for all treatment combinations. Herbaceous cover was also equally reduced by all logging treatments. Season of harvest, method of delimbing and presence or absence of scarification therefore did not appear to be significant factors in determining the post-harvest vascular plant cover. Removal of the forest canopy appeared to be the primary factor resulting in similar reductions of vascular plant cover, regardless of timber harvest treatment combination. Most remaining shrub and herb species appeared to be unhealthy and dying. This was likely attributable to the altered environmental conditions of the cut-block. These conditions included increased temperature, light and wind extremes resulting from removal of the forest canopy.

Previous studies have indicated that regeneration of dwarf shrub communities may be slow following logging. Snyder & Woodard (1992) observed large decreases in dwarf shrub abundance immediately following logging with slow recovery occurring over a 30 year period after timber harvest. Corns & La Roi (1976), Nieppola (1992) and Abrams & Dickmann (1981) observed similar results for the initial stages of dwarf shrub regeneration. Initial revegetation of sites may consist largely of invading competitor-

species with original shrub species regaining dominance after several years (Dyrness, 1973; Brumelis & Carleton, 1989).

As with shrub communities, previous studies have also shown that large decreases in herbaceous plant cover can occur immediately following logging (Corns & La Roi, 1976; Nieppola, 1992; Snyder & Woodard, 1992). Recovery of herbaceous species appears to be much more rapid with post-harvest vegetation abundance often approaching pre-harvest levels within 10 years of logging (Abrams & Dickmann, 1981; Nieppola, 1992; Snyder & Woodard, 1992). Competitive herbaceous species may dominate the initial revegetation of sites with original species regaining dominance after several years (Dyrness, 1973; Brumelis & Carleton, 1989). For this study, the abundance of shrub and herb species is expected to continue decreasing over the next few years in response to altered microenvironmental conditions. Decreases may abate following revegetation of the sites which would ameliorate microenvironmental extremes.

Differences between timber harvesting treatments were evident in the reduction of terrestrial bryophyte communities. Terrestrial bryophytes decreased in abundance following all treatment combinations. As with the shrub and herb communities, post-harvest bryophyte populations consisted primarily of common rather than rare species of mosses and liverworts. All bryophytes present following logging consisted of species that were present before timber harvest took place and replacement or turnover of bryophyte species did not occur. The short time frame of this study accounts for the absence of invading bryophyte species. Pre- and post-harvest abundances of individual non-vascular plant species for all treatment combinations are provided in Appendices 4.19 - 4.27.

Scarification was the primary factor in determining bryophyte abundance following timber harvest treatments. Scarification severely damaged vegetation and disturbed the ground surface exposing large amounts of mineral soil. Bryophyte cover was reduced to a greater degree following all treatment combinations involving scarification as compared to similar treatments without scarification. Winter harvested sites that were scarified consisted essentially of intact bryophyte communities with large furrows of exposed mineral soil.

Season of harvest appeared to be a major factor determining the amount of disturbance to terrestrial bryophyte communities. Regardless of the treatment combination, summer harvesting decreased bryophyte abundance to a greater degree than winter harvesting. For most sites, summer harvesting reduced the original bryophyte communities to isolated patches and fragments. The large difference apparent between summer and winter harvest was likely attributable to the absence of a snowpack during harvesting in the summer. During the summer, bryophytes are easily damaged by wheel and track traffic of heavy machinery and by trees that are dragged across the ground surface. In addition, bryophytes lack a vascular root system like that of higher plants and so are easily removed from the ground surface and displaced. In the winter, the ground is frozen and logging machinery travels on a snowpack which reduces or eliminates physical disturbance at the ground surface. This minimizes damage to the ground surface and to terrestrial bryophyte communities. As with vascular plant species however, bryophytes are affected by the removal of the forest canopy. Mosses and liverworts in winter harvested sites often appeared to have sustained no physical damage from the logging machinery during timber harvest yet seemed to be suffering from desiccation.

Delimbing also influenced the degree to which bryophyte cover decreased, although not to the extent as either scarification or summer harvest. Stump-side delimbing in combination with summer harvesting and scarification generally caused the greatest damage to terrestrial bryophytes. This was probably attributable to increased machinery traffic on the site which has been documented for stump-side delimbing practices (Araki, 1994). In addition, stump-side delimbing generally deposited large amounts of woody debris on-site which were dragged across the ground surface of sites by the scarifier which may have resulted in increased ground disturbance and damage to bryophytes than by scarifying drags alone.

Road-side delimbing in combination with winter harvest and followed by no scarification resulted in the greatest amount of bryophyte cover left on the sites. The slash piles provided by stump-side delimbing did not appear to increase the retention of bryophytes. As discussed in Chapter 1, underneath these piles the environmental extremes of temperature, light, moisture and wind of the cut-block are reduced. At pile

edges, fluctuations in light and temperature were moderated, and combined with high moisture levels appeared to provide suitable short-term microenvironments for terrestrial lichens. It appears that the microenvironmental conditions provided by these slash piles may not be more beneficial to terrestrial bryophytes than those of road-side delimbed sites. Slash piles may alter light and moisture levels beyond the tolerance limits of bryophytes.

As with shrub and herb communities, previous studies have shown large decreases in bryophyte cover immediately following logging (Corns & La Roi, 1976; Nieppola, 1992; Snyder & Woodard, 1992). Recovery of bryophyte species occurs very slowly with post-harvest abundance remaining lower than pre-logging levels 30 years after timber harvest (Snyder & Woodard, 1992). Bryophyte species appear to be affected by altered microenvironmental conditions to a much greater degree than vascular plants. Brinkman (1936) observed that rapid reduction of bryophyte communities usually occurred following removal of the forest canopy even without physical disturbance of the bryophyte flora. For this study, the abundance of bryophytes is expected to continue decreasing over the next few years in response to altered microenvironmental conditions. Decreases may abate following revegetation of the sites which would ameliorate microenvironmental extremes although the recovery of bryophyte communities may take much longer than that of vascular plants.

2.5) Conclusion

Shrubs, herbaceous plants and terrestrial bryophytes showed decreases in cover following all treatment combinations. Data support Hypothesis 1: post-harvest abundance will be lower than pre-harvest abundance for all treated sites.

Regardless of the treatment combination, summer harvesting reduced the abundance of bryophytes to a greater degree than comparable treatments harvested in the winter. Bryophyte data support Hypothesis 2: summer harvesting will result in greater decreases in abundance than winter harvesting, regardless of treatment combination tested. Summer harvesting did not always result in greater reductions of shrub and herbaceous cover for all treatment combinations and therefore data did not support Hypothesis 2.

Scarification, regardless of the treatment combination, reduced the abundance of bryophytes to a greater degree than comparable treatments without scarification. Bryophyte data support Hypothesis 3: scarification will result in greater decreases in abundance than no scarification, regardless of treatment combination tested. Scarification did not always result in greater reductions of shrub and herbaceous cover for all treatment combinations and therefore data did not support Hypothesis 3.

Regardless of the treatment combination, stump-side delimbing reduced the abundance of bryophytes to a greater degree than comparable treatments with road-side delimbing. Bryophyte data support Hypothesis 4: stump-side delimbing will result in greater decreases in abundance than road-side delimbing, regardless of treatment combination tested. Stump-side delimbing did not always result in greater reductions of shrub and herbaceous cover for all treatment combinations and therefore data did not support Hypothesis 4.

Similar responses by the shrub and herb communities to all of the treatment combinations indicated that the cover of these species was reduced irrespective of logging method employed. Trends were evident for bryophytes however. Summer harvesting and stump-side delimbing with scarification proved to be the treatment combination which resulted in the greatest reductions of bryophyte species abundance. The treatment combination of winter harvesting and road-side delimbing with no scarification resulted in the greatest retention of bryophyte cover. The slash piles provided by stump-side delimbing do not appear to maintain the abundance of shrubs, herbs and terrestrial bryophytes over the short-term.

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General Conclusion, Management Recommendations and Future Research

Conclusion

The purpose of this study was to determine the short-term effects of various timber harvesting methods and to identify logging methods that reduce mechanical damage to terrestrial lichen and understory plant communities present in woodland caribou habitat. This was accomplished by examining the 4 main hypotheses, outlined in the General Introduction, dealing with various logging practice combinations to determine the differential effects on terrestrial lichen and understory plant species.

Hypothesis 1 was supported by the results of this study. All lichen and plant species showed a general decrease in abundance following all logging treatment combinations. Hypotheses 2 and 3 were supported by the results of terrestrial lichen and bryophyte species. Abundances of terrestrial lichens and bryophytes decreased to a greater extent following treatment combinations with a) summer harvesting as compared to winter harvesting and b) scarification as compared to no scarification. Hypothesis 4 was only supported by the terrestrial bryophyte results of this study. Only the abundance of bryophyte species was consistently reduced to a greater extent with stump-side delimbing than road-side delimbing, regardless of treatment combination.

The greatest overall short-term reduction in abundance of lichens and bryophytes resulted from summer harvesting and stump-side delimbing followed by scarification. This treatment combination appeared to maximize the amount of ground disturbance on-site, resulting in the greatest amounts of damage to lichen and bryophyte communities. Although road-side delimbing, as compared to stump-side processing, tended to result in lower covers of species for lichens and bryophytes when combined with summer harvesting and scarification, the overall effects of delimbing were minor when compared to season of harvest and scarification.

The greatest short-term retention of terrestrial lichens resulted from winter harvesting and stump-side delimbing with no scarification. This treatment combination appeared to reduce heavy machinery traffic on the ground surface due to the protective snowpack present during winter logging. Stump-side delimbing appeared to provide

suitable microhabitats for lichens following timber harvest and the absence of scarification eliminated severe ground disturbance and damage to remaining lichens. Similar responses by shrub and herb communities to all of the treatment combinations indicated that the cover of these species was reduced regardless of logging method employed. The greatest short-term retention of terrestrial bryophytes resulted from winter harvesting and scarification with road-side delimbing. Compared to terrestrial lichens, bryophytes appeared to respond differently to the microenvironmental conditions of the slash piles.

Recommendations

The lichen and bryophyte results of this study provided a strong indication of appropriate timber harvesting methods for the short-term maintenance of woodland caribou forage. Treatment combinations involving summer harvesting and scarification resulted in the greatest short-term decreases in abundance of terrestrial lichens and understory plants. It is recommended that these timber harvesting methods be reduced or eliminated from use in regions where the short-term maintenance of forage species in woodland caribou habitat is of concern. Logging operations should incorporate winter timber harvest without spring scarification to reduce the amount of damage to vegetation during logging. This treatment combination minimizes heavy machinery traffic on-site which reduces the amount of mechanical damage to terrestrial lichens and bryophytes thereby maintaining the greatest abundance of caribou forage after timber harvest. Stump-side delimbing, when applied in conjunction with winter harvesting increases the retention of terrestrial lichens immediately following logging by providing suitable microhabitats. Given the greater importance of terrestrial lichens in the caribou diet, increased lichen abundance may outweigh decreases in bryophyte cover that may result from stump-side delimbing.

Future Research

This research presents results for only one year following timber harvest and therefore only examines the initial impact of mechanical damage by logging machinery on terrestrial lichens and understory plants. Previous studies have indicated that vegetation

continues to decrease during the years immediately following timber harvest in response to altered microenvironmental conditions (Brinkman, 1936; Dyrness, 1973; Corns & La Roi, 1976; Kauppi et al., 1978; Kirby, 1988; Brumelis & Carleton, 1989; Nieppola, 1992; Snyder & Woodard, 1992). The species composition and pattern of revegetation immediately following timber harvest may differ from the original lichen and plant communities depending upon the species present in the immediate and surrounding areas as well as the long-term, on-site effects of the various timber harvest practices.

The results presented in this study indicate that the slash piles produced by stump-side delimbing may serve to maintain the highest abundance of terrestrial lichens immediately following logging by providing favorable microhabitats. Slash piles may provide suitable cover for the regeneration of lichens and possibly vascular and non-vascular plants as well over a much longer time frame. The revegetation of logged sites may therefore be enhanced by the increased abundance of species on-site serving as sources of lichen and plant species for recolonization.

Previous studies have shown that species replacement or turnover can occur in logged sites with competitive lichens and plants dominating the original species for several years (Dyrness, 1973; Brumelis & Carleton, 1989). Changes in the species composition of caribou habitat may severely alter the quality of forage available to woodland caribou. Studies have also indicated that the long-term regeneration of terrestrial lichens on logged sites may be improved by increased disturbance such as summer harvesting or scarification (Harris, 1992; Snyder & Woodard, 1992). Long-term increases in the terrestrial lichen cover of woodland caribou habitat may be more beneficial than short-term maintenance. These are issues on which little information is available.

This study is unique in Alberta and is among few such research projects currently taking place in Canada (Enns, 1992; Anonymous, 1995, Thomas & Armbruster, 1996). Detailed information on all species of lichens, bryophytes, shrubs, and herbaceous plants collected prior to timber harvest as well as immediately following logging has created a baseline of information on which future research can be based. Permanent sample plots in the study area will facilitate future monitoring of lichen and plant communities as

long-term effects of the various logging treatments become apparent. Present as well as future information will be valuable in the development of long-term management strategies that incorporate the maintenance of woodland caribou habitat with commercial timber harvest operations.

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Appendix 1.1 Percentage classes and percent cover ranges used to estimate abundances of lichens and all vascular and non-vascular plant species.

Percentage Assigned	Percent Cover Range
95	95 - 99
90	90 - 94
80	80 - 89
70	70 - 79
60	60 - 69
50	50 - 59
40	40 - 49
30	30 - 39
25	25 - 29
20	20 - 24
15	15 - 19
10	10 - 14
8	8 - 9
5	5 - 7
3	3 - 4
2	2
1	1
0.1	species present with trace cover

In each sample unit (quadrat), individual lichen and plant species were assigned specific percentages based on visual estimation of the percent cover range. Total abundance of lichen and plant groups were calculated by addition of species percent covers for each group.

Appendix 1.2 Abundance of terrestrial lichens¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	36.93 \pm 2.90	1.91 \pm 0.39 *	ab
S2	35.54 \pm 2.56	1.81 \pm 0.33 *	ab
S3	36.83 \pm 3.29	2.80 \pm 0.41 *	ab
S4	29.53 \pm 2.95	5.36 \pm 1.00 *	b
W1	44.57 \pm 3.42	8.59 \pm 1.18 *	a
W2	43.24 \pm 3.34	10.12 \pm 1.68 *	ab
W3	37.39 \pm 2.89	35.60 \pm 3.64	c
W4	35.78 \pm 3.66	28.25 \pm 3.45 *	c
<u>Control</u>			
C1	27.40 \pm 2.97	27.65 \pm 3.09	c
C2	37.22 \pm 2.76	36.39 \pm 2.91	c
C3	35.19 \pm 2.87	39.12 \pm 3.14 *	c
C4	49.40 \pm 3.63	48.42 \pm 3.69	c

¹ includes all lichen species, except crustose growth forms, found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.3 Abundance of terrestrial lichens¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	27.08 \pm 2.57	1.55 \pm 0.23 *	ab
S2	23.23 \pm 2.30	3.28 \pm 0.60 *	bc
S3	36.44 \pm 2.56	10.64 \pm 1.34 *	ab
S4	30.88 \pm 2.19	8.52 \pm 1.43 *	b
W1	44.35 \pm 3.36	9.19 \pm 1.07 *	a
W2	47.53 \pm 3.16	12.81 \pm 1.50 *	a
W3	35.62 \pm 3.92	32.03 \pm 3.75 *	de
W4	48.77 \pm 3.30	38.17 \pm 2.79 *	cd
<u>Control</u>			
C1	33.06 \pm 3.42	33.20 \pm 3.39	e
C2	41.36 \pm 4.15	36.32 \pm 3.92 *	de
C3	48.99 \pm 4.03	47.75 \pm 4.03	e
C4	31.35 \pm 2.62	32.04 \pm 2.90	e

¹ includes all lichen species, except crustose growth forms, found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.4 Abundance of terrestrial lichens¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	49.65 \pm 3.14	4.64 \pm 0.59 *	a
S2	40.85 \pm 2.98	7.25 \pm 1.41 *	a
S3	34.85 \pm 2.20	17.23 \pm 2.24 *	b
S4	37.23 \pm 2.43	16.12 \pm 1.99 *	b
W1	33.32 \pm 2.69	13.94 \pm 1.40 *	b
W2	37.84 \pm 2.89	12.45 \pm 1.74 *	b
W3	45.22 \pm 2.85	28.40 \pm 2.51 *	b
W4	45.87 \pm 2.61	27.47 \pm 2.15 *	b
<u>Control</u>			
C1	29.60 \pm 2.98	33.61 \pm 3.58 *	c
C2	27.12 \pm 3.15	23.53 \pm 2.83 *	c
C3	40.34 \pm 3.03	47.79 \pm 3.51 *	c
C4	45.34 \pm 4.07	37.51 \pm 3.84 *	c

¹ includes all lichen species, except crustose growth forms, found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.5 Summary statistics for three-way ANOVA of terrestrial lichen abundance

Stand 1

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	5358.02040	5358.02040	31.58724 *
Factor B	1	12028.49595	12028.49595	70.91181 *
Factor C	1	636.27540	636.27540	3.75105
First-order interaction A X B	1	5269.23551	5269.23551	31.06382 *
First-order interaction A X C	1	141.81237	141.81237	0.83603
First-order interaction B X C	1	206.54001	206.54001	1.21762
Second-order interaction A X B X C	1	242.28479	242.28479	1.42835
Within Groups (Error)	392	66493.44131	169.62613	
Total	399	23882.66444		

$F_{0.05(1),1,392} = 3.87$

Stand 2

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	89.07584	89.07584	0.56083
Factor B	1	6392.32230	6392.32230	40.24700 *
Factor C	1	65.33489	65.33489	0.41136
First-order interaction A X B	1	8454.25081	8454.25081	53.22920 *
First-order interaction A X C	1	369.10094	369.10094	2.32391
First-order interaction B X C	1	70.86272	70.86272	0.44616
Second-order interaction A X B X C	1	18.24144	18.24144	0.11485
Within Groups (Error)	392	62260.30188	158.82730	
Total	399	15459.18896		

$F_{0.05(1),1,392} = 3.87$

Stand 3

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	3459.91004	3459.91004	23.13180 *
Factor B	1	6924.07052	6924.07052	46.29202 *
Factor C	1	19.13188	19.13188	0.12791
First-order interaction A X B	1	2058.25542	2058.25542	13.76081 *
First-order interaction A X C	1	795.40921	795.40921	5.31784 *
First-order interaction B X C	1	122.92157	122.92157	0.82181
Second-order interaction A X B X C	1	795.46562	795.46562	5.31822 *
Within Groups (Error)	392	58632.90904	149.57375	
Total	399	14175.16426		

$F_{0.05(1),1,392} = 3.87$

Factor A = Season of Timber Harvest

Factor B = Scarification

Factor C = Method of Delimbing

* = significant factor / interaction

Appendix 1.6 Abundance of *Cladina* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	17.89 \pm 1.90	0.74 \pm 0.15 *	a
S2	15.15 \pm 1.53	1.12 \pm 0.29 *	a
S3	18.81 \pm 2.23	1.39 \pm 0.26 *	a
S4	15.65 \pm 2.33	2.68 \pm 0.57 *	ab
W1	23.30 \pm 2.81	4.82 \pm 0.86 *	a
W2	26.81 \pm 2.72	6.78 \pm 1.36 *	a
W3	21.87 \pm 2.46	23.11 \pm 3.05	bc
W4	18.45 \pm 2.91	16.37 \pm 2.88	c
<u>Control</u>			
C1	15.16 \pm 2.58	15.70 \pm 2.66	c
C2	22.23 \pm 2.49	21.01 \pm 2.55	c
C3	14.20 \pm 2.07	16.34 \pm 2.44 *	c
C4	29.53 \pm 3.18	28.22 \pm 3.17	c

¹ includes all species of *Cladina* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.001$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.7 Abundance of *Cladina* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	12.81 \pm 1.87	0.85 \pm 0.15 *	bcd
S2	10.47 \pm 1.73	1.58 \pm 0.39 *	cde
S3	19.75 \pm 2.07	5.81 \pm 0.92 *	abc
S4	17.87 \pm 2.00	4.94 \pm 0.91 *	bcd
W1	24.54 \pm 2.73	5.20 \pm 0.68 *	ab
W2	30.83 \pm 2.82	8.71 \pm 1.18 *	a
W3	18.81 \pm 3.15	16.06 \pm 2.92	efd
W4	33.99 \pm 2.87	26.08 \pm 2.46 *	cd
<u>Control</u>			
C1	15.91 \pm 2.60	15.69 \pm 2.66	f
C2	22.99 \pm 3.02	20.73 \pm 3.02 *	ef
C3	25.00 \pm 2.71	23.24 \pm 2.53	f
C4	14.61 \pm 1.91	15.40 \pm 2.21	f

¹ includes all species of *Cladina* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.8 Abundance of *Cladina* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	27.43 \pm 2.61	2.94 \pm 0.43 *	a
S2	23.29 \pm 2.52	4.76 \pm 1.02 *	ab
S3	18.83 \pm 2.00	9.41 \pm 1.67 *	bc
S4	21.33 \pm 2.23	10.54 \pm 1.66 *	bc
W1	19.71 \pm 2.05	8.61 \pm 0.97 *	bc
W2	18.49 \pm 2.07	6.88 \pm 1.10 *	bc
W3	24.03 \pm 2.64	16.81 \pm 2.21 *	cd
W4	27.37 \pm 2.40	15.71 \pm 1.86 *	bc
<u>Control</u>			
C1	16.19 \pm 2.58	18.29 \pm 2.87	e
C2	9.46 \pm 1.95	8.02 \pm 1.73	e
C3	14.98 \pm 1.71	17.97 \pm 2.03 *	de
C4	19.73 \pm 2.61	16.89 \pm 2.60 *	de

¹ includes all species of *Cladina* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.9 Summary statistics for three-way ANOVA of *Cladina* species abundance

Stand 1

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	1308.26890	1308.26890	9.58119 *
Factor B	1	4783.65890	4783.65890	35.03344 *
Factor C	1	311.13432	311.13432	2.27861
First-order interaction A X B	1	3457.32240	3457.32240	25.31993 *
First-order interaction A X C	1	134.28174	134.28174	0.98342
First-order interaction B X C	1	273.37316	273.37316	2.00207
Second-order interaction A X B X C	1	9.66588	9.66588	0.07079
Within Groups (Error)	392	53525.84198	136.54552	
Total	399	10277.70530		

$$F_{0.05(1),1,392} = 3.87$$

Stand 2

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	384.68938	384.68938	2.77468
Factor B	1	1325.50606	1325.50606	9.56058 *
Factor C	1	51.68891	51.68891	0.37282
First-order interaction A X B	1	4656.08346	4656.08346	33.58330 *
First-order interaction A X C	1	739.26891	739.26891	5.33218 *
First-order interaction B X C	1	9.36666	9.36666	0.06756
Second-order interaction A X B X C	1	2.86117	2.86117	0.02064
Within Groups (Error)	392	54347.98359	138.64282	
Total	399	7169.46455		

$$F_{0.05(1),1,392} = 3.87$$

Stand 3

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	1555.78969	1555.78969	12.77436 *
Factor B	1	3150.63303	3150.63303	25.86937 *
Factor C	1	2.81736	2.81736	0.02313
First-order interaction A X B	1	644.67749	644.67749	5.29335 *
First-order interaction A X C	1	292.63234	292.63234	2.40276
First-order interaction B X C	1	271.17856	271.17856	2.22661
Second-order interaction A X B X C	1	4.41630	4.41630	0.03626
Within Groups (Error)	392	47741.70822	121.79007	
Total	399	5922.14478		

$$F_{0.05(1),1,392} = 3.87$$

Factor A = Season of Timber Harvest

Factor B = Scarification

Factor C = Method of Delimbing

* = significant factor / interaction

Appendix 1.10 Abundance of *Cladonia* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	12.59 \pm 1.82	1.04 \pm 0.28 *	a
S2	7.96 \pm 0.96	0.41 \pm 0.10 *	ab
S3	7.99 \pm 0.92	1.12 \pm 0.20 *	ab
S4	8.63 \pm 1.37	1.81 \pm 0.66 *	b
W1	8.64 \pm 0.94	2.81 \pm 0.45 *	bc
W2	7.52 \pm 0.70	1.70 \pm 0.33 *	bc
W3	7.38 \pm 0.88	7.57 \pm 1.13	d
W4	7.54 \pm 0.74	6.52 \pm 0.55	d
<u>Control</u>			
C1	5.89 \pm 1.05	5.18 \pm 0.79	d
C2	6.38 \pm 0.70	6.80 \pm 0.78	d
C3	6.60 \pm 0.90	6.94 \pm 1.02	d
C4	10.37 \pm 0.98	11.94 \pm 1.37	cd

¹ includes all species of *Cladonia* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.11 Abundance of *Cladonia* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	8.39 \pm 1.15	0.59 \pm 0.12 *	ab
S2	5.62 \pm 0.81	0.86 \pm 0.20 *	bcd
S3	9.22 \pm 0.97	3.27 \pm 0.40 *	abc
S4	8.16 \pm 0.80	2.25 \pm 0.55 *	abc
W1	10.65 \pm 1.84	3.02 \pm 0.43 *	abc
W2	11.69 \pm 1.10	3.53 \pm 0.68 *	a
W3	8.96 \pm 1.25	11.33 \pm 1.66 *	cde
W4	8.32 \pm 0.97	8.54 \pm 0.97	def
<u>Control</u>			
C1	7.22 \pm 1.03	7.79 \pm 1.11	f
C2	5.77 \pm 0.82	5.49 \pm 0.79	f
C3	7.26 \pm 0.96	8.21 \pm 1.04	ef
C4	5.53 \pm 0.99	5.94 \pm 0.99	f

¹ includes all species of *Cladonia* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.001$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.12 Abundance of *Cladonia* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	13.02 \pm 1.29	1.22 \pm 0.24 *	a
S2	8.39 \pm 0.78	1.67 \pm 0.33 *	b
S3	10.72 \pm 0.92	6.86 \pm 0.97 *	b
S4	9.17 \pm 0.94	3.96 \pm 0.64 *	b
W1	6.76 \pm 0.66	3.91 \pm 0.47 *	bc
W2	7.91 \pm 0.99	3.21 \pm 0.49 *	b
W3	12.66 \pm 1.30	8.61 \pm 0.99 *	b
W4	11.81 \pm 1.15	8.79 \pm 0.98 *	bcd
<u>Control</u>			
C1	5.32 \pm 0.69	5.56 \pm 0.81	d
C2	7.03 \pm 0.90	6.97 \pm 0.91	d
C3	7.07 \pm 0.74	8.06 \pm 0.86	cd
C4	6.35 \pm 1.33	5.54 \pm 1.09	d

¹ includes all species of *Cladonia* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.13 Summary statistics for three-way ANOVA of *Cladonia* species abundance

Stand 1

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	2245.43300	2245.43300	44.17195 *
Factor B	1	1371.14684	1371.14684	26.97307 *
Factor C	1	86.95563	86.95563	1.71058
First-order interaction A X B	1	127.66740	127.66740	2.51146
First-order interaction A X C	1	57.28976	57.28976	1.12700
First-order interaction B X C	1	29.87716	29.87716	0.58774
Second-order interaction A X B X C	1	83.50304	83.50304	1.64266
Within Groups (Error)	392	19926.89354	50.83391	
Total	399	4001.87282		

$$F_{0.05(1),1,392} = 3.87$$

Stand 2

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	179.78787	179.78787	3.41088
Factor B	1	878.97426	878.97426	16.67562 *
Factor C	1	134.03851	134.03851	2.54294
First-order interaction A X B	1	1217.20743	1217.20743	23.09247 *
First-order interaction A X C	1	19.60276	19.60276	0.37190
First-order interaction B X C	1	17.83795	17.83795	0.33842
Second-order interaction A X B X C	1	500.34979	500.34979	9.49248 *
Within Groups (Error)	392	20662.37311	52.71014	
Total	399	2947.79857		

$$F_{0.05(1),1,392} = 3.87$$

Stand 3

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	873.26160	873.26160	20.91559 *
Factor B	1	656.79438	656.79438	15.73096 *
Factor C	1	191.21358	191.21358	4.57978 *
First-order interaction A X B	1	280.09370	280.09370	6.70856 *
First-order interaction A X C	1	88.84948	88.84948	2.12804
First-order interaction B X C	1	53.47997	53.47997	1.28091
Second-order interaction A X B X C	1	445.08341	445.08341	10.66025 *
Within Groups (Error)	392	16366.66826	41.75170	
Total	399	2588.77612		

$$F_{0.05(1),1,392} = 3.87$$

Factor A = Season of Timber Harvest

Factor B = Scarification

Factor C = Method of Delimbing

* = significant factor / interaction

Appendix 1.14 Abundance of *Peltigera* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	5.87 \pm 0.85	0.06 \pm 0.02 *	abc
S2	8.05 \pm 1.31	0.10 \pm 0.02 *	ab
S3	3.52 \pm 0.65	0.12 \pm 0.04 *	cdef
S4	4.68 \pm 0.94	0.71 \pm 0.33 *	bcd
W1	11.15 \pm 1.61	0.73 \pm 0.15 *	a
W2	6.27 \pm 1.27	1.05 \pm 0.27 *	bcd
W3	5.67 \pm 0.86	2.88 \pm 0.48 *	bcde
W4	7.20 \pm 1.58	3.40 \pm 0.68 *	bcde
<u>Control</u>			
C1	5.27 \pm 0.93	5.59 \pm 1.25	ef
C2	7.89 \pm 1.64	7.88 \pm 1.64	f
C3	13.72 \pm 2.09	15.07 \pm 2.00	cdef
C4	5.54 \pm 0.80	5.31 \pm 0.75	def

¹ includes all species of *Peltigera* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.15 Abundance of *Peltigera* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	5.27 \pm 0.84	0.08 \pm 0.01 *	ab
S2	3.54 \pm 0.80	0.29 \pm 0.07 *	bc
S3	6.23 \pm 0.86	1.28 \pm 0.31 *	ab
S4	3.83 \pm 0.70	1.00 \pm 0.33 *	bc
W1	8.42 \pm 1.23	0.82 \pm 0.41 *	a
W2	3.42 \pm 0.66	0.44 \pm 0.17 *	bc
W3	7.69 \pm 1.34	4.39 \pm 0.93 *	abc
W4	5.96 \pm 1.14	3.11 \pm 0.53 *	bc
<u>Control</u>			
C1	6.18 \pm 0.94	6.94 \pm 1.02	c
C2	5.49 \pm 0.81	3.89 \pm 0.57 *	c
C3	5.87 \pm 1.00	6.25 \pm 1.10	c
C4	9.62 \pm 1.46	9.42 \pm 1.41	c

¹ includes all species of *Peltigera* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.001$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.16 Abundance of *Peltigera* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	5.99 \pm 0.99	0.16 \pm 0.05 *	ab
S2	7.71 \pm 1.01	0.68 \pm 0.30 *	a
S3	4.43 \pm 0.61	0.69 \pm 0.18 *	abc
S4	5.38 \pm 0.77	1.15 \pm 0.25 *	abc
W1	5.85 \pm 0.93	1.22 \pm 0.20 *	abc
W2	10.32 \pm 1.72	2.03 \pm 0.52 *	a
W3	6.64 \pm 0.91	2.38 \pm 0.38 *	abc
W4	4.66 \pm 0.81	1.90 \pm 0.33 *	bc
<u>Control</u>			
C1	6.27 \pm 1.18	8.15 \pm 1.71	c
C2	9.16 \pm 1.51	7.48 \pm 1.35	c
C3	8.82 \pm 1.15	11.69 \pm 1.47 *	bc
C4	13.51 \pm 1.91	10.45 \pm 1.53 *	bc

¹ includes all species of *Peltigera* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.17 Summary statistics for three-way ANOVA of *Peltigera* species abundance

Stand 1

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	10.59828	10.59828	0.14534
Factor B	1	1772.62051	1772.62051	24.30823 *
Factor C	1	63.32181	63.32181	0.86834
First-order interaction A X B	1	4.43313	4.43313	0.06079
First-order interaction A X C	1	567.13041	567.13041	7.77715 *
First-order interaction B X C	1	175.33732	175.33732	2.40443
Second-order interaction A X B X C	1	261.16176	261.16176	3.58135
Within Groups (Error)	392	28585.68078	72.92266	
Total	399	2854.60322		

$$F_{0.05(1),1,392} = 3.87$$

Stand 2

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	0.00189	0.00189	0.00003
Factor B	1	50.51656	50.51656	0.84883
Factor C	1	1146.46574	1146.46574	19.26401 *
First-order interaction A X B	1	203.10525	203.10525	3.41277
First-order interaction A X C	1	11.74776	11.74776	0.19740
First-order interaction B X C	1	99.75016	99.75016	1.67610
Second-order interaction A X B X C	1	102.40428	102.40428	1.72069
Within Groups (Error)	392	23329.23213	59.51335	
Total	399	1613.99163		

$$F_{0.05(1),1,392} = 3.87$$

Stand 3

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	61.90542	61.90542	1.00678
Factor B	1	903.66372	903.66372	14.69649 *
Factor C	1	78.49960	78.49960	1.27666
First-order interaction A X B	1	26.79098	26.79098	0.43571
First-order interaction A X C	1	17.86753	17.86753	0.29058
First-order interaction B X C	1	328.18946	328.18946	5.33742 *
Second-order interaction A X B X C	1	167.78021	167.78021	2.72865
Within Groups (Error)	392	24103.45006	61.48839	
Total	399	1584.69692		

$$F_{0.05(1),1,392} = 3.87$$

Factor A = Season of Timber Harvest

Factor B = Scarification

Factor C = Method of Delimbing

* = significant factor / interaction

Appendix 1.18 Abundance of *Stereocaulon* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.17 \pm 0.10	0.02 \pm 0.01	c
S2	3.27 \pm 1.14	0.10 \pm 0.03 *	ab
S3	5.96 \pm 1.75	0.08 \pm 0.02 *	a
S4	0.08 \pm 0.02	0.02 \pm 0.01	c
W1	0.78 \pm 0.35	0.13 \pm 0.07	c
W2	2.27 \pm 1.24	0.47 \pm 0.21	bc
W3	1.73 \pm 0.94	1.43 \pm 1.01	c
W4	1.31 \pm 0.52	1.07 \pm 0.51	c
<u>Control</u>			
C1	0.85 \pm 0.32	0.97 \pm 0.46	c
C2	0.37 \pm 0.12	0.31 \pm 0.10	c
C3	0.59 \pm 0.41	0.69 \pm 0.44	c
C4	2.89 \pm 1.12	2.23 \pm 0.89	c

¹ *Stereocaulon tomentosum* was the only species found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.19 Abundance of *Stereocaulon* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.37 \pm 0.19	0.01 \pm 0.004	a
S2	0.39 \pm 0.22	0.10 \pm 0.05	a
S3	0.75 \pm 0.51	0.08 \pm 0.06	a
S4	0.41 \pm 0.16	0.08 \pm 0.04	a
W1	0.20 \pm 0.12	0.04 \pm 0.03	a
W2	1.24 \pm 0.77	0.07 \pm 0.04	a
W3	0.06 \pm 0.04	0.10 \pm 0.10	a
W4	0.23 \pm 0.12	0.16 \pm 0.07	a
<u>Control</u>			
C1	1.01 \pm 0.41	0.57 \pm 0.22	a
C2	4.75 \pm 1.59	4.31 \pm 1.45	a
C3	9.81 \pm 2.82	9.24 \pm 2.78	a
C4	1.01 \pm 0.61	0.87 \pm 0.51	a

¹ *Stereocaulon tomentosum* was the only species found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.20 Abundance of *Stereocaulon* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	2.51 \pm 0.87	0.15 \pm 0.07 *	a
S2	0.97 \pm 0.44	0.05 \pm 0.02	ab
S3	0.51 \pm 0.23	0.15 \pm 0.06	b
S4	0.73 \pm 0.26	0.25 \pm 0.14	b
W1	0.69 \pm 0.60	0.09 \pm 0.05	b
W2	0.67 \pm 0.27	0.15 \pm 0.07	b
W3	0.90 \pm 0.39	0.17 \pm 0.09	b
W4	0.86 \pm 0.25	0.44 \pm 0.11	ab
<u>Control</u>			
C1	1.19 \pm 0.53	1.09 \pm 0.49	b
C2	1.11 \pm 0.39	0.79 \pm 0.27	b
C3	8.78 \pm 2.68	9.48 \pm 2.78	ab
C4	4.78 \pm 1.76	4.07 \pm 1.56	b

¹ *Stereocaulon tomentosum* was the only species found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.21 Abundance of *Cetraria* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

Treatment	Pre-Harvest	Post-Harvest	
S1	0.40 \pm 0.09	0.05 \pm 0.01	abc
S2	0.84 \pm 0.19	0.08 \pm 0.01	a
S3	0.56 \pm 0.11	0.09 \pm 0.01	ab
S4	0.49 \pm 0.12	0.14 \pm 0.02	ab
W1	0.60 \pm 0.21	0.10 \pm 0.02	abc
W2	0.36 \pm 0.09	0.11 \pm 0.02	bcd
W3	0.72 \pm 0.20	0.58 \pm 0.15	bcd
W4	1.28 \pm 0.40	0.88 \pm 0.25	ab
Control			
C1	0.23 \pm 0.08	0.21 \pm 0.09	d
C2	0.36 \pm 0.14	0.38 \pm 0.19	cd
C3	0.08 \pm 0.02	0.08 \pm 0.02	d
C4	1.04 \pm 0.23	0.67 \pm 0.14	cd

¹ includes all species of *Cetraria* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.22 Abundance of *Cetraria* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.24 \pm 0.07	0.02 \pm 0.01	bc
S2	3.21 \pm 0.74	0.45 \pm 0.08 *	a
S3	0.50 \pm 0.12	0.20 \pm 0.04	bc
S4	0.60 \pm 0.13	0.25 \pm 0.07	bc
W1	0.54 \pm 0.13	0.09 \pm 0.02	bc
W2	0.34 \pm 0.10	0.06 \pm 0.01	bc
W3	0.10 \pm 0.04	0.15 \pm 0.06	c
W4	0.29 \pm 0.08	0.27 \pm 0.06	bc
<u>Control</u>			
C1	2.50 \pm 0.67	2.03 \pm 0.56	b
C2	2.15 \pm 0.55	1.64 \pm 0.50	b
C3	1.06 \pm 0.19	0.80 \pm 0.16	bc
C4	0.51 \pm 0.16	0.29 \pm 0.09	bc

¹ includes all species of *Cetraria* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.23 Abundance of *Cetraria* species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.64 \pm 0.13	0.16 \pm 0.04	abc
S2	0.48 \pm 0.10	0.09 \pm 0.01	abc
S3	0.34 \pm 0.08	0.11 \pm 0.01	abc
S4	0.60 \pm 0.12	0.22 \pm 0.05	abc
W1	0.29 \pm 0.11	0.11 \pm 0.01	bc
W2	0.44 \pm 0.13	0.17 \pm 0.05	abc
W3	0.99 \pm 0.20	0.43 \pm 0.21	a
W4	1.14 \pm 0.26	0.61 \pm 0.19	ab
<u>Control</u>			
C1	0.63 \pm 0.17	0.49 \pm 0.17	bc
C2	0.35 \pm 0.09	0.27 \pm 0.08	c
C3	0.69 \pm 0.24	0.59 \pm 0.20	bc
C4	0.93 \pm 0.24	0.47 \pm 0.13 *	ab

¹ includes all species of *Cetraria* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.24 Abundance of non-reindeer lichen species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.00 \pm 0.00	0.002 \pm 0.002	b
S2	0.26 \pm 0.16	0.002 \pm 0.002	a
S3	0.00 \pm 0.00	0.00 \pm 0.00	b
S4	0.002 \pm 0.002	0.00 \pm 0.00	b
W1	0.11 \pm 0.06	0.002 \pm 0.002	ab
W2	0.002 \pm 0.002	0.002 \pm 0.002	b
W3	0.02 \pm 0.02	0.04 \pm 0.04	ab
W4	0.00 \pm 0.00	0.00 \pm 0.00	b
<u>Control</u>			
C1	0.00 \pm 0.00	0.00 \pm 0.00	b
C2	0.00 \pm 0.00	0.00 \pm 0.00	b
C3	0.00 \pm 0.00	0.00 \pm 0.00	b
C4	1.20 \pm 0.02	0.05 \pm 0.03	ab

¹ includes species of *Dactylina*, *Nephroma*, *Pertusaria* and *Solorina* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.25 Abundance of non-reindeer lichen species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.004 \pm 0.003	0.00 \pm 0.00	a
S2	0.00 \pm 0.00	0.00 \pm 0.00	a
S3	0.00 \pm 0.00	0.00 \pm 0.00	a
S4	0.00 \pm 0.00	0.00 \pm 0.00	a
W1	0.00 \pm 0.00	0.02 \pm 0.02	a
W2	0.00 \pm 0.00	0.00 \pm 0.00	a
W3	0.00 \pm 0.00	0.00 \pm 0.00	a
W4	0.00 \pm 0.00	0.00 \pm 0.00	a
<u>Control</u>			
C1	0.24 \pm 0.17	0.18 \pm 0.12	a
C2	0.20 \pm 0.12	0.26 \pm 0.17	a
C3	0.002 \pm 0.002	0.00 \pm 0.00	a
C4	0.08 \pm 0.06	0.12 \pm 0.10	a

¹ includes all species of *Dactylina*, *Nephroma*, *Pertusaria* and *Solorina* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 1.26 Abundance of non-reindeer lichen species¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.05 \pm 0.03	0.002 \pm 0.002	a
S2	0.00 \pm 0.00	0.00 \pm 0.00	a
S3	0.02 \pm 0.02	0.00 \pm 0.00	a
S4	0.004 \pm 0.003	0.004 \pm 0.003	a
W1	0.02 \pm 0.02	0.00 \pm 0.00	a
W2	0.002 \pm 0.002	0.004 \pm 0.003	a
W3	0.002 \pm 0.002	0.002 \pm 0.002	a
W4	0.04 \pm 0.04	0.02 \pm 0.02	a
<u>Control</u>			
C1	0.004 \pm 0.003	0.02 \pm 0.02	a
C2	0.00 \pm 0.00	0.00 \pm 0.00	a
C3	0.00 \pm 0.00	0.00 \pm 0.00	a
C4	0.04 \pm 0.04	0.08 \pm 0.06	a

¹ includes all species of *Dactylina*, *Nephroma*, *Pertusaria* and *Solorina* found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.1 Abundance of shrub plants¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	15.18 \pm 1.21	0.08 \pm 0.04 *	a
S2	14.53 \pm 1.69	0.22 \pm 0.12 *	a
S3	20.24 \pm 2.15	1.71 \pm 0.50 *	a
S4	15.00 \pm 1.42	0.33 \pm 0.09 *	a
W1	14.94 \pm 1.14	0.43 \pm 0.12 *	a
W2	19.15 \pm 2.01	0.39 \pm 0.13 *	a
W3	22.39 \pm 2.59	5.07 \pm 1.39 *	a
W4	17.75 \pm 1.75	2.81 \pm 0.51 *	a
<u>Control</u>			
C1	28.01 \pm 2.70	34.32 \pm 2.82 *	b
C2	23.02 \pm 2.09	27.91 \pm 2.39 *	b
C3	12.96 \pm 1.20	13.96 \pm 1.36	c
C4	21.60 \pm 2.79	19.96 \pm 3.02	b

¹ includes all species of shrubs, dwarf shrubs, and tree seedlings < 1.3 m in height found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.2 Abundance of shrub plants¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	11.65 \pm 1.01	0.14 \pm 0.07 *	b
S2	22.80 \pm 2.27	0.64 \pm 0.46 *	a
S3	14.16 \pm 1.38	0.74 \pm 0.17 *	b
S4	15.09 \pm 1.02	1.09 \pm 0.41 *	b
W1	13.43 \pm 1.46	0.18 \pm 0.05 *	b
W2	12.21 \pm 1.12	0.30 \pm 0.16 *	b
W3	11.91 \pm 1.81	1.89 \pm 0.39 *	bcd
W4	14.29 \pm 1.62	2.63 \pm 0.61 *	bc
<u>Control</u>			
C1	20.12 \pm 2.03	20.46 \pm 2.29	e
C2	21.72 \pm 2.39	22.50 \pm 2.33	de
C3	26.17 \pm 1.92	25.16 \pm 2.40	cde
C4	26.28 \pm 2.77	26.01 \pm 2.82	e

¹ includes all species of shrubs, dwarf shrubs, and tree seedlings < 1.3 m in height found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.3 Abundance of shrub plants¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	12.81 \pm 1.45	0.20 \pm 0.07 *	a
S2	16.83 \pm 1.50	0.17 \pm 0.05 *	a
S3	18.41 \pm 1.68	1.51 \pm 0.29 *	a
S4	19.33 \pm 1.42	1.47 \pm 0.25 *	a
W1	17.75 \pm 1.94	0.70 \pm 0.20 *	a
W2	19.00 \pm 1.96	0.53 \pm 0.15 *	a
W3	13.22 \pm 1.19	1.85 \pm 0.43 *	a
W4	16.81 \pm 1.31	1.57 \pm 0.19 *	a
<u>Control</u>			
C1	20.14 \pm 2.17	24.16 \pm 2.83 *	b
C2	24.66 \pm 2.83	25.05 \pm 3.18	b
C3	15.99 \pm 1.63	18.35 \pm 2.14 *	b
C4	27.33 \pm 2.75	27.99 \pm 2.94	b

¹ includes all species of shrubs, dwarf shrubs, and tree seedlings < 1.3 m in height found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.4 Summary statistics for three-way ANOVA of shrub species abundance

Stand 1

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	42.44523	42.44523	0.56117
Factor B	1	13.18416	13.18416	0.17431
Factor C	1	46.81296	46.81296	0.61891
First-order interaction A X B	1	127.66740	127.66740	1.68788
First-order interaction A X C	1	182.79040	182.79040	2.41666
First-order interaction B X C	1	180.84870	180.84870	2.39099
Second-order interaction A X B X C	1	66.65090	66.65090	0.88119
Within Groups (Error)	392	29649.94233	75.63761	
Total	399	660.39975		

$F_{0.05(1),1,392} = 3.87$

Stand 2

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	1134.40976	1134.40976	16.99901 *
Factor B	1	413.02433	413.02433	6.18913 *
Factor C	1	603.24272	603.24272	9.03953 *
First-order interaction A X B	1	0.42641	0.42641	0.00639
First-order interaction A X C	1	353.55281	353.55281	5.29795 *
First-order interaction B X C	1	101.62656	101.62656	1.52286
Second-order interaction A X B X C	1	595.11602	595.11602	8.91775 *
Within Groups (Error)	392	26159.67318	66.73386	
Total	399	3201.39862		

$F_{0.05(1),1,392} = 3.87$

Stand 3

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	13.48726	13.48726	0.19878
Factor B	1	9.76250	9.76250	0.14388
Factor C	1	457.16854	457.16854	6.73783 *
First-order interaction A X B	1	722.66881	722.66881	10.65082 *
First-order interaction A X C	1	1.20231	1.20231	0.01772
First-order interaction B X C	1	0.70141	0.70141	0.01034
Second-order interaction A X B X C	1	124.93651	124.93651	1.84134
Within Groups (Error)	392	26597.60491	67.85103	
Total	399	1329.92733		

$F_{0.05(1),1,392} = 3.87$

Factor A = Season of Timber Harvest

Factor B = Scarification

Factor C = Method of Delimbing

* = significant factor / interaction

Appendix 2.5 Abundance of herbaceous plants¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.88 \pm 0.25	0.03 \pm 0.02	bc
S2	2.70 \pm 0.66	0.12 \pm 0.06 *	a
S3	0.40 \pm 0.14	0.18 \pm 0.05	c
S4	0.13 \pm 0.05	0.09 \pm 0.05	c
W1	0.32 \pm 0.09	0.02 \pm 0.01	c
W2	0.52 \pm 0.25	0.05 \pm 0.01	c
W3	0.46 \pm 0.20	0.13 \pm 0.07	c
W4	0.16 \pm 0.08	0.01 \pm 0.004	c
<u>Control</u>			
C1	0.88 \pm 0.29	1.13 \pm 0.32	c
C2	0.58 \pm 0.18	0.67 \pm 0.17	c
C3	3.38 \pm 0.34	3.54 \pm 0.35	ab
C4	0.32 \pm 0.12	0.39 \pm 0.13	c

¹ includes all species of forbs, graminoids, clubmosses and horsetails found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.6 Abundance of herbaceous plants¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	2.24 \pm 0.31	0.06 \pm 0.04 *	a
S2	1.17 \pm 0.26	0.14 \pm 0.11	bcde
S3	2.19 \pm 0.40	0.22 \pm 0.12 *	ab
S4	2.48 \pm 0.41	0.03 \pm 0.01 *	a
W1	1.65 \pm 0.30	0.002 \pm 0.002 *	abcd
W2	1.85 \pm 0.27	0.01 \pm 0.004 *	ab
W3	1.99 \pm 0.29	0.32 \pm 0.12 *	abc
W4	1.89 \pm 0.28	0.05 \pm 0.02 *	ab
<u>Control</u>			
C1	0.20 \pm 0.04	0.68 \pm 0.16	de
C2	0.94 \pm 0.22	1.26 \pm 0.34	cde
C3	0.26 \pm 0.12	0.38 \pm 0.20	e
C4	1.73 \pm 0.27	4.69 \pm 0.69 *	a

¹ includes all species of forbs, graminoids, clubmosses and horsetails found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.7 Abundance of herbaceous plants¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	0.92 \pm 0.17	0.04 \pm 0.01	abcde
S2	1.43 \pm 0.19	0.02 \pm 0.01 *	ab
S3	0.57 \pm 0.22	0.06 \pm 0.04	de
S4	0.18 \pm 0.06	0.02 \pm 0.01	e
W1	1.37 \pm 0.32	0.02 \pm 0.01	abcd
W2	2.19 \pm 0.57	0.04 \pm 0.02 *	a
W3	0.34 \pm 0.12	0.03 \pm 0.01	e
W4	0.75 \pm 0.16	0.05 \pm 0.01	cde
<u>Control</u>			
C1	2.34 \pm 0.55	2.87 \pm 0.78	abc
C2	1.91 \pm 0.40	3.43 \pm 0.56 *	abc
C3	1.36 \pm 0.25	1.98 \pm 0.30	abcde
C4	1.16 \pm 0.28	1.62 \pm 0.34	bcde

¹ includes all species of forbs, gramminoids, clubmosses and horsetails found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.8 Abundance of terrestrial bryophytes¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 1 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	30.53 \pm 3.70	5.70 \pm 1.14 *	a
S2	20.12 \pm 3.27	4.84 \pm 1.41 *	abc
S3	20.02 \pm 3.54	1.68 \pm 0.53 *	abc
S4	46.02 \pm 3.51	8.89 \pm 2.20 *	e
W1	22.14 \pm 3.47	5.93 \pm 1.04 *	ab
W2	16.15 \pm 2.87	6.65 \pm 1.37 *	bcd
W3	26.94 \pm 3.63	17.65 \pm 2.79 *	bcd
W4	49.37 \pm 4.62	36.07 \pm 4.47 *	abc
<u>Control</u>			
C1	47.53 \pm 4.96	45.29 \pm 5.35	bcd
C2	45.30 \pm 4.17	42.46 \pm 4.28 *	cd
C3	32.22 \pm 3.84	36.34 \pm 3.82 *	bcd
C4	21.38 \pm 3.40	19.62 \pm 3.04	d

¹ includes all species of mosses and liverworts found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.9 Abundance of terrestrial bryophytes¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 2 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	41.81 \pm 4.84	5.25 \pm 0.99 *	ab
S2	31.77 \pm 3.94	8.89 \pm 1.51 *	bc
S3	44.36 \pm 4.39	15.91 \pm 2.67 *	ab
S4	35.60 \pm 4.19	7.54 \pm 1.55 *	bc
W1	54.43 \pm 4.45	16.82 \pm 2.56 *	a
W2	47.61 \pm 4.71	10.33 \pm 1.40 *	ab
W3	57.31 \pm 4.86	43.66 \pm 4.57 *	cd
W4	34.16 \pm 4.25	31.23 \pm 3.94 *	de
<u>Control</u>			
C1	9.76 \pm 2.21	10.41 \pm 2.30	e
C2	10.82 \pm 1.95	10.75 \pm 1.91	e
C3	16.27 \pm 3.09	17.68 \pm 3.02	e
C4	32.13 \pm 4.16	38.10 \pm 4.30 *	de

¹ includes all species of mosses and liverworts found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.10 Abundance of terrestrial bryophytes¹ (mean percent cover \pm S.E.) before and after timber harvest for stand 3 ($n = 50$ for each treatment).

<u>Treatment</u>	<u>Pre-Harvest</u>	<u>Post-Harvest</u>	
S1	14.17 \pm 2.71	2.30 \pm 0.53 *	bcd
S2	18.59 \pm 3.60	6.40 \pm 1.36 *	ab
S3	19.97 \pm 3.10	9.30 \pm 1.67 *	bcd
S4	30.27 \pm 4.19	13.93 \pm 2.66 *	ab
W1	19.55 \pm 2.99	5.78 \pm 1.53 *	ab
W2	26.72 \pm 4.27	11.17 \pm 1.99 *	a
W3	31.25 \pm 3.90	21.74 \pm 3.16 *	bc
W4	16.97 \pm 3.25	12.96 \pm 2.59 *	cde
<u>Control</u>			
C1	22.87 \pm 3.92	23.48 \pm 4.08	e
C2	37.25 \pm 4.99	37.37 \pm 4.95	de
C3	24.10 \pm 3.62	26.03 \pm 3.81	de
C4	21.21 \pm 3.88	22.16 \pm 3.85	e

¹ includes all species of mosses and liverworts found growing on soil and/or downed woody material.

* indicates significant difference ($P < 0.05$) between pre-harvest and post-harvest years determined by t-Test calculations on pairwise comparisons of arcsine-transformed data.

Note: letters indicate homogeneous groups (1-Way ANOVA, Tukey test, $P < 0.05$).

Appendix 2.11 Summary statistics for three-way ANOVA of bryophyte species abundance

Stand 1

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	6420.33613	6420.33613	27.68221 *
Factor B	1	643.89063	643.89063	2.77623
Factor C	1	210.39503	210.39503	0.90715
First-order interaction A X B	1	792.02845	792.02845	3.41495
First-order interaction A X C	1	656.02577	656.02577	2.82855
First-order interaction B X C	1	7136.36353	7136.36353	30.76947 *
Second-order interaction A X B X C	1	1407.97553	1407.97553	6.07069 *
Within Groups (Error)	392	90916.57366	231.93003	
Total	399	17267.01506		
$F_{0.05(1),1,392} = 3.87$				

Stand 2

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	1031.98350	1031.98350	3.33650
Factor B	1	11967.37542	11967.37542	38.69163 *
Factor C	1	2456.04492	2456.04492	7.94062 *
First-order interaction A X B	1	9130.28026	9130.28026	29.51904 *
First-order interaction A X C	1	12.64158	12.64158	0.04087
First-order interaction B X C	1	128.53891	128.53891	0.41558
Second-order interaction A X B X C	1	467.57575	467.57575	1.51172
Within Groups (Error)	392	121246.15014	309.30140	
Total	399	25194.44034		
$F_{0.05(1),1,392} = 3.87$				

Stand 3

Source of Variation	df	Sum of Squares	Mean Square	F _{calculated}
Factor A	1	73.77092	73.77092	0.35939
Factor B	1	997.23324	997.23324	4.85823 *
Factor C	1	96.60924	96.60924	0.47065
First-order interaction A X B	1	1689.86766	1689.86766	8.23254 *
First-order interaction A X C	1	738.86112	738.86112	3.59951
First-order interaction B X C	1	377.36948	377.36948	1.83843
Second-order interaction A X B X C	1	681.88877	681.88877	3.32196
Within Groups (Error)	392	80464.65819	205.26699	
Total	399	4655.60044		
$F_{0.05(1),1,392} = 3.87$				

Factor A = Season of Timber Harvest

Factor B = Scarification

Factor C = Method of Delimbing

* = significant factor / interaction

Appendix 3.1 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial lichen species for summer harvested sites of Stand 1.

Lichens:	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Cetraria ericetorum</i>	0.256 \pm 0.067	0.018 \pm 0.005	0.310 \pm 0.065	0.024 \pm 0.006	0.444 \pm 0.104	0.048 \pm 0.007	0.168 \pm 0.060	0.048 \pm 0.007
<i>Cetraria islandica</i>	0.002 \pm 0.002	0.002 \pm 0.002	0.140 \pm 0.103	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.008 \pm 0.004
<i>Cladonia mitis</i>	13.826 \pm 1.562	0.738 \pm 0.150	13.440 \pm 1.471	0.958 \pm 0.226	18.688 \pm 2.152	1.362 \pm 0.258	8.460 \pm 1.407	2.204 \pm 0.477
<i>Cladonia rangiferina</i>	4.064 \pm 0.859	0.002 \pm 0.002	1.708 \pm 0.554	0.162 \pm 0.160	2.120 \pm 0.995	0.026 \pm 0.020	7.188 \pm 1.708	0.474 \pm 0.148
<i>Cladonia stellaris</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia amaurocraea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia borealis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.028 \pm 0.020	0.000 \pm 0.000	0.008 \pm 0.004	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia botrytes</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia camelia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cenotea</i>	0.022 \pm 0.020	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.006 \pm 0.003	0.000 \pm 0.000	0.014 \pm 0.005	0.002 \pm 0.002
<i>Cladonia cervicornis</i> subsp. <i>verticillata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.006 \pm 0.003	0.000 \pm 0.000	0.046 \pm 0.007	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia chlorophaea</i>	0.054 \pm 0.020	0.002 \pm 0.002	0.046 \pm 0.007	0.000 \pm 0.000	0.036 \pm 0.020	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia coniocrea</i>	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.022 \pm 0.006	0.000 \pm 0.000
<i>Cladonia cornuta</i>	0.916 \pm 0.198	0.010 \pm 0.004	0.750 \pm 0.146	0.006 \pm 0.003	0.500 \pm 0.112	0.008 \pm 0.004	0.742 \pm 0.152	0.072 \pm 0.034
<i>Cladonia crispata</i>	0.998 \pm 0.195	0.004 \pm 0.003	0.822 \pm 0.172	0.046 \pm 0.040	1.992 \pm 0.597	0.022 \pm 0.020	0.462 \pm 0.120	0.008 \pm 0.004
<i>Cladonia deformis</i>	0.050 \pm 0.007	0.016 \pm 0.005	0.100 \pm 0.033	0.022 \pm 0.006	0.306 \pm 0.127	0.020 \pm 0.006	0.194 \pm 0.076	0.036 \pm 0.020
<i>Cladonia emocyna</i>	5.924 \pm 1.119	0.614 \pm 0.196	4.362 \pm 0.522	0.216 \pm 0.061	2.556 \pm 0.429	0.560 \pm 0.166	3.540 \pm 0.711	0.706 \pm 0.195
<i>Cladonia fimbriata</i>	0.052 \pm 0.020	0.002 \pm 0.002	0.040 \pm 0.007	0.008 \pm 0.004	0.040 \pm 0.007	0.004 \pm 0.003	0.032 \pm 0.007	0.004 \pm 0.003
<i>Cladonia furcata</i>	0.646 \pm 0.198	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia gracilis</i>	0.056 \pm 0.028	0.000 \pm 0.000	0.006 \pm 0.003	0.004 \pm 0.003	0.528 \pm 0.133	0.000 \pm 0.000	0.634 \pm 0.186	0.006 \pm 0.003
<i>Cladonia gravi</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.016 \pm 0.005	0.000 \pm 0.000	0.010 \pm 0.004	0.000 \pm 0.000	0.028 \pm 0.006	0.004 \pm 0.003	0.004 \pm 0.003	0.000 \pm 0.000
<i>Cladonia pyxidata</i>	0.010 \pm 0.004	0.002 \pm 0.002	0.008 \pm 0.004	0.000 \pm 0.000	0.012 \pm 0.005	0.006 \pm 0.003	0.006 \pm 0.003	0.000 \pm 0.000
<i>Cladonia sulphurina</i>	3.842 \pm 1.528	0.386 \pm 0.210	1.312 \pm 0.683	0.000 \pm 0.000	1.924 \pm 0.482	0.494 \pm 0.131	2.968 \pm 1.092	0.002 \pm 0.002
<i>Cladonia uncialis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.106 \pm 0.048	0.110 \pm 0.059	0.034 \pm 0.007	0.002 \pm 0.002	0.000 \pm 0.000
<i>Dactylina arctica</i>	0.140 \pm 0.046	0.024 \pm 0.006	0.332 \pm 0.122	0.044 \pm 0.007	0.000 \pm 0.000	0.000 \pm 0.000	0.256 \pm 0.108	0.048 \pm 0.007
<i>Flavocetraria cucullata</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.062 \pm 0.034	0.010 \pm 0.004	0.004 \pm 0.003	0.006 \pm 0.003	0.062 \pm 0.034	0.038 \pm 0.020
<i>Flavocetraria nivalis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Nephroma arcticum</i>	2.106 \pm 0.444	0.022 \pm 0.006	1.462 \pm 0.595	0.034 \pm 0.007	0.782 \pm 0.354	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Nephroma expallidum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.122 \pm 0.102	0.054 \pm 0.028	2.668 \pm 0.754	0.584 \pm 0.318
<i>Peltigera aphthosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	2.612 \pm 0.533	0.070 \pm 0.028	0.482 \pm 0.316	0.000 \pm 0.000
<i>Peltigera leucophaea</i>	3.668 \pm 0.748	0.036 \pm 0.020	6.588 \pm 1.287	0.066 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	1.530 \pm 0.382	0.124 \pm 0.047
<i>Peltigera malacea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera neopolydactyla</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera retifoveata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera rufescens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera scabrosa</i>	0.100 \pm 0.100	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pertusaria dactylina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solorina crocea</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.122 \pm 0.102	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Stereocaulon tomentosum</i>	0.174 \pm 0.104	0.020 \pm 0.006	3.272 \pm 1.139	0.096 \pm 0.027	5.964 \pm 1.746	0.084 \pm 0.020	0.082 \pm 0.039	0.024 \pm 0.006

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 3.2 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial lichen species for winter harvested sites of Stand 1.

	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Lichens:								
<i>Cetraria encicetorum</i>	0.166 \pm 0.061	0.028 \pm 0.006	0.124 \pm 0.026	0.044 \pm 0.007	0.110 \pm 0.039	0.072 \pm 0.020	0.130 \pm 0.047	0.070 \pm 0.020
<i>Cetraria islandica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.040 \pm 0.040	0.048 \pm 0.040	0.002 \pm 0.002
<i>Cladonia mitis</i>	21.060 \pm 2.820	4.250 \pm 0.848	25.304 \pm 2.776	6.502 \pm 1.340	19.708 \pm 2.336	19.968 \pm 2.863	13.182 \pm 2.424	12.188 \pm 2.256
<i>Cladonia rangiferina</i>	2.244 \pm 1.051	0.570 \pm 0.212	1.508 \pm 0.663	0.282 \pm 0.128	2.168 \pm 1.012	3.142 \pm 1.304	5.246 \pm 1.198	4.186 \pm 1.226
<i>Cladonia stellaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000
<i>Cladonia amaroceae</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.060 \pm 0.060	0.060 \pm 0.060
<i>Cladonia borealis</i>	0.006 \pm 0.003	0.002 \pm 0.002	0.032 \pm 0.020	0.004 \pm 0.003	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia botrytes</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia carneola</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cenotea</i>	0.034 \pm 0.020	0.002 \pm 0.002	0.018 \pm 0.005	0.002 \pm 0.002	0.042 \pm 0.020	0.006 \pm 0.003	0.006 \pm 0.003	0.012 \pm 0.005
<i>Cladonia cetriconis</i> subsp. <i>vericillata</i>	0.020 \pm 0.020	0.002 \pm 0.002	0.002 \pm 0.002	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia chlorophaea</i>	0.016 \pm 0.005	0.000 \pm 0.000	0.018 \pm 0.005	0.000 \pm 0.000	0.018 \pm 0.005	0.006 \pm 0.003	0.006 \pm 0.003	0.000 \pm 0.000
<i>Cladonia conflorea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cornuta</i>	0.450 \pm 0.103	0.044 \pm 0.020	1.008 \pm 0.239	0.208 \pm 0.160	0.712 \pm 0.137	0.572 \pm 0.146	0.342 \pm 0.084	0.238 \pm 0.059
<i>Cladonia crispata</i>	2.260 \pm 0.449	0.280 \pm 0.093	1.488 \pm 0.207	0.096 \pm 0.063	1.102 \pm 0.264	1.152 \pm 0.447	0.372 \pm 0.173	0.194 \pm 0.105
<i>Cladonia deformis</i>	0.140 \pm 0.050	0.032 \pm 0.007	0.088 \pm 0.027	0.050 \pm 0.020	0.092 \pm 0.027	0.050 \pm 0.007	0.092 \pm 0.044	0.094 \pm 0.033
<i>Cladonia emocyna</i>	3.752 \pm 0.716	1.856 \pm 0.307	3.700 \pm 0.547	0.986 \pm 0.194	4.144 \pm 0.574	4.592 \pm 0.665	5.088 \pm 0.591	4.218 \pm 0.500
<i>Cladonia fimbriata</i>	0.082 \pm 0.020	0.026 \pm 0.006	0.050 \pm 0.007	0.028 \pm 0.006	0.076 \pm 0.020	0.052 \pm 0.007	0.028 \pm 0.006	0.028 \pm 0.006
<i>Cladonia furcata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia gracilis</i>	1.480 \pm 0.263	0.088 \pm 0.039	0.864 \pm 0.165	0.190 \pm 0.074	0.758 \pm 0.152	0.490 \pm 0.140	0.524 \pm 0.185	0.506 \pm 0.202
<i>Cladonia grayi</i>	0.014 \pm 0.005	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.004 \pm 0.003	0.002 \pm 0.002	0.004 \pm 0.003	0.002 \pm 0.002
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia multifomis</i>	0.004 \pm 0.003	0.000 \pm 0.000	0.004 \pm 0.003	0.002 \pm 0.002	0.006 \pm 0.003	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia pyxidata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.008 \pm 0.004	0.000 \pm 0.000
<i>Cladonia sulphurina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.008 \pm 0.004	0.000 \pm 0.000
<i>Cladonia uncialis</i>	0.380 \pm 0.164	0.474 \pm 0.185	0.248 \pm 0.101	0.126 \pm 0.058	0.424 \pm 0.230	0.642 \pm 0.327	1.008 \pm 0.314	1.170 \pm 0.367
<i>Dactylina arctica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Flavocetraria cucullata</i>	0.332 \pm 0.130	0.060 \pm 0.020	0.230 \pm 0.080	0.054 \pm 0.020	0.526 \pm 0.196	0.440 \pm 0.146	0.794 \pm 0.233	0.530 \pm 0.143
<i>Flavocetraria nivalis</i>	0.102 \pm 0.100	0.008 \pm 0.004	0.006 \pm 0.003	0.010 \pm 0.004	0.082 \pm 0.056	0.024 \pm 0.020	0.312 \pm 0.208	0.278 \pm 0.166
<i>Nephroma arcticum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Nephroma expallidum</i>	0.042 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera aphthosa</i>	1.724 \pm 0.831	0.250 \pm 0.111	0.706 \pm 0.300	0.162 \pm 0.069	1.384 \pm 0.504	0.544 \pm 0.162	3.088 \pm 1.132	1.412 \pm 0.458
<i>Peltigera leucophlebia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.180 \pm 0.117	0.002 \pm 0.002
<i>Peltigera malacea</i>	9.422 \pm 1.540	0.482 \pm 0.115	5.566 \pm 1.226	0.890 \pm 0.265	4.262 \pm 0.757	2.334 \pm 0.468	3.934 \pm 1.036	1.982 \pm 0.546
<i>Peltigera neopolydactyla</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera retifoveata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera rufescens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera scabrosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pertusaria dactylina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solorina crocea</i>	0.064 \pm 0.044	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.020 \pm 0.020	0.040 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000
<i>Stereocaulon tomentosum</i>	0.776 \pm 0.352	0.128 \pm 0.071	2.268 \pm 1.238	0.468 \pm 0.215	1.730 \pm 0.941	1.426 \pm 0.1014	1.308 \pm 0.524	1.074 \pm 0.514

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 3.3 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial lichen species for control sites of Stand 1.

Lichens:	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Cetraria ericetorum</i>	0.082 \pm 0.028	0.068 \pm 0.020	0.062 \pm 0.007	0.058 \pm 0.007	0.040 \pm 0.007	0.034 \pm 0.007	0.116 \pm 0.026	0.192 \pm 0.052
<i>Cetraria islandica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002
<i>Cladonia mitis</i>	12.914 \pm 2.293	13.050 \pm 2.353	14.502 \pm 1.903	13.104 \pm 1.926	7.470 \pm 1.176	8.272 \pm 1.315	26.400 \pm 3.046	24.926 \pm 3.120
<i>Cladonia rangiferina</i>	2.250 \pm 0.667	2.650 \pm 0.798	7.684 \pm 1.813	7.804 \pm 1.683	6.732 \pm 1.617	8.070 \pm 1.976	3.126 \pm 1.171	3.290 \pm 1.216
<i>Cladonia stellaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.040 \pm 0.040	0.100 \pm 0.100	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia amaurocraea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia borealis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000	0.064 \pm 0.060	0.022 \pm 0.020
<i>Cladonia carneola</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cenotea</i>	0.016 \pm 0.005	0.020 \pm 0.006	0.046 \pm 0.020	0.036 \pm 0.020	0.003 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cervicornis</i> subsp. <i>verticillata</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.034 \pm 0.020	0.004 \pm 0.003	0.004 \pm 0.003
<i>Cladonia chlorophaea</i>	0.016 \pm 0.005	0.004 \pm 0.003	0.006 \pm 0.003	0.010 \pm 0.004	0.030 \pm 0.007	0.012 \pm 0.005	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia coniocraea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.022 \pm 0.006	0.004 \pm 0.003	0.004 \pm 0.003	0.022 \pm 0.006
<i>Cladonia cornuta</i>	0.386 \pm 0.137	0.458 \pm 0.135	0.352 \pm 0.067	0.246 \pm 0.065	0.530 \pm 0.176	0.500 \pm 0.174	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia crispata</i>	0.606 \pm 0.141	0.466 \pm 0.136	1.214 \pm 0.232	1.176 \pm 0.224	0.684 \pm 0.210	0.658 \pm 0.212	0.802 \pm 0.137	0.656 \pm 0.135
<i>Cladonia deformis</i>	0.120 \pm 0.047	0.078 \pm 0.028	0.132 \pm 0.037	0.128 \pm 0.047	0.122 \pm 0.038	0.104 \pm 0.033	1.308 \pm 0.274	1.318 \pm 0.248
<i>Cladonia emocymia</i>	4.286 \pm 0.963	3.696 \pm 0.749	3.396 \pm 0.508	3.698 \pm 0.572	3.378 \pm 0.404	3.546 \pm 0.457	0.054 \pm 0.020	0.072 \pm 0.028
<i>Cladonia fimbriata</i>	0.048 \pm 0.007	0.042 \pm 0.007	0.102 \pm 0.027	0.074 \pm 0.020	0.052 \pm 0.007	0.046 \pm 0.007	6.546 \pm 0.929	7.648 \pm 1.298
<i>Cladonia furcata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.072 \pm 0.020	0.044 \pm 0.007
<i>Cladonia gracilis</i>	0.134 \pm 0.054	0.138 \pm 0.067	0.342 \pm 0.146	0.576 \pm 0.189	0.658 \pm 0.337	0.854 \pm 0.421	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia grayi</i>	0.006 \pm 0.003	0.012 \pm 0.005	0.010 \pm 0.004	0.022 \pm 0.006	0.006 \pm 0.003	0.008 \pm 0.004	0.930 \pm 0.321	1.672 \pm 0.369
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.008 \pm 0.004	0.004 \pm 0.003
<i>Cladonia multifomis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia pyxidata</i>	0.006 \pm 0.003	0.004 \pm 0.003	0.012 \pm 0.005	0.016 \pm 0.005	0.010 \pm 0.004	0.000 \pm 0.000	0.002 \pm 0.002	0.008 \pm 0.004
<i>Cladonia sulphurina</i>	0.034 \pm 0.020	0.018 \pm 0.005	0.006 \pm 0.003	0.006 \pm 0.003	0.024 \pm 0.006	0.008 \pm 0.004	0.002 \pm 0.002	0.008 \pm 0.004
<i>Cladonia uncialis</i>	0.246 \pm 0.101	0.242 \pm 0.126	0.762 \pm 0.431	0.802 \pm 0.496	1.044 \pm 0.639	1.162 \pm 0.719	0.570 \pm 0.252	0.464 \pm 0.208
<i>Dactylina arctica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.004 \pm 0.003
<i>Flavocetraria cucullata</i>	0.106 \pm 0.062	0.078 \pm 0.060	0.070 \pm 0.028	0.042 \pm 0.020	0.018 \pm 0.005	0.018 \pm 0.005	0.002 \pm 0.002	0.004 \pm 0.003
<i>Flavocetraria nivalis</i>	0.042 \pm 0.040	0.064 \pm 0.060	0.224 \pm 0.141	0.284 \pm 0.187	0.024 \pm 0.020	0.024 \pm 0.020	0.772 \pm 0.205	0.386 \pm 0.127
<i>Nephroma arcticum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.152 \pm 0.075	0.090 \pm 0.048
<i>Nephroma expallidum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera aphosa</i>	1.916 \pm 0.455	1.914 \pm 0.519	2.318 \pm 0.779	2.370 \pm 0.836	6.148 \pm 1.359	6.628 \pm 1.430	0.002 \pm 0.002	0.022 \pm 0.020
<i>Peltigera leucophaea</i>	0.480 \pm 0.283	0.702 \pm 0.423	0.322 \pm 0.300	0.302 \pm 0.300	1.482 \pm 0.740	1.380 \pm 0.657	1.984 \pm 0.524	2.026 \pm 0.519
<i>Peltigera malacea</i>	2.872 \pm 0.801	2.974 \pm 1.130	5.248 \pm 1.436	5.212 \pm 1.390	6.026 \pm 1.458	7.004 \pm 1.549	0.020 \pm 0.020	0.040 \pm 0.028
<i>Peltigera neopolydactyla</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	3.246 \pm 0.665	3.246 \pm 0.665
<i>Peltigera retifoveata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.060 \pm 0.060	0.060 \pm 0.060	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera rufescens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera scabrosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pertusaria dactylina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solorina crocea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.020 \pm 0.020
<i>Stereocaulon tomentosum</i>	0.850 \pm 0.322	0.968 \pm 0.460	0.374 \pm 0.120	0.314 \pm 0.103	0.594 \pm 0.411	0.692 \pm 0.444	2.892 \pm 1.124	2.234 \pm 0.887

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 3.4 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial lichen species for summer harvested sites of Stand 2.

Lichens:	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Cetraria ericetorum</i>	0.082 \pm 0.027	0.012 \pm 0.005	0.474 \pm 0.174	0.080 \pm 0.020	0.158 \pm 0.041	0.058 \pm 0.020	0.162 \pm 0.049	0.070 \pm 0.007
<i>Cetraria islandica</i>	0.006 \pm 0.003	0.000 \pm 0.000	0.090 \pm 0.039	0.032 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.006 \pm 0.003	0.002 \pm 0.002
<i>Cladonia mitis</i>	10.306 \pm 1.752	0.694 \pm 0.118	7.006 \pm 1.230	1.344 \pm 0.340	16.062 \pm 1.822	4.776 \pm 0.898	12.866 \pm 1.617	4.048 \pm 0.797
<i>Cladonia rangiferina</i>	2.504 \pm 0.760	0.152 \pm 0.075	3.464 \pm 1.119	0.240 \pm 0.162	3.686 \pm 1.237	1.032 \pm 0.277	5.004 \pm 1.474	0.894 \pm 0.325
<i>Cladonia stellaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia amaurocraea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia borealis</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000
<i>Cladonia botrytes</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia cameola</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia cenotea</i>	0.196 \pm 0.093	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia cervicornis</i> subsp. <i>verticillata</i>	0.020 \pm 0.020	0.000 \pm 0.000	0.008 \pm 0.004	0.000 \pm 0.000	0.020 \pm 0.006	0.002 \pm 0.002	0.070 \pm 0.020	0.002 \pm 0.002
<i>Cladonia chlorophaea</i>	0.062 \pm 0.020	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia confocraea</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.050 \pm 0.020	0.004 \pm 0.003	0.064 \pm 0.020	0.000 \pm 0.000	0.092 \pm 0.027	0.000 \pm 0.000
<i>Cladonia cornuta</i>	1.086 \pm 0.230	0.024 \pm 0.020	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002
<i>Cladonia crispata</i>	0.552 \pm 0.140	0.004 \pm 0.003	0.396 \pm 0.122	0.032 \pm 0.020	1.122 \pm 0.181	0.208 \pm 0.078	1.060 \pm 0.217	0.060 \pm 0.020
<i>Cladonia deformis</i>	0.182 \pm 0.056	0.028 \pm 0.006	0.216 \pm 0.063	0.010 \pm 0.004	1.220 \pm 0.288	0.168 \pm 0.077	0.990 \pm 0.255	0.152 \pm 0.049
<i>Cladonia emocyna</i>	4.668 \pm 0.795	0.368 \pm 0.092	0.058 \pm 0.020	0.022 \pm 0.006	0.190 \pm 0.055	0.038 \pm 0.007	0.204 \pm 0.101	0.050 \pm 0.007
<i>Cladonia fimbriata</i>	0.044 \pm 0.007	0.006 \pm 0.003	3.288 \pm 0.533	0.558 \pm 0.140	4.650 \pm 0.612	2.740 \pm 0.376	4.590 \pm 0.723	1.428 \pm 0.278
<i>Cladonia furcata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.098 \pm 0.044	0.030 \pm 0.020	0.034 \pm 0.007	0.018 \pm 0.005	0.048 \pm 0.007	0.008 \pm 0.004
<i>Cladonia gracilis</i>	0.174 \pm 0.072	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.040 \pm 0.040	0.000 \pm 0.000
<i>Cladonia grayi</i>	0.026 \pm 0.020	0.000 \pm 0.000	0.188 \pm 0.079	0.002 \pm 0.002	1.114 \pm 0.306	0.022 \pm 0.020	0.660 \pm 0.165	0.024 \pm 0.020
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.020 \pm 0.020	0.000 \pm 0.000	0.006 \pm 0.003	0.000 \pm 0.000	0.012 \pm 0.005	0.000 \pm 0.000	0.008 \pm 0.003	0.000 \pm 0.000
<i>Cladonia multifornis</i>	0.020 \pm 0.020	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia pyxidata</i>	0.012 \pm 0.005	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia sulphurina</i>	0.012 \pm 0.005	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia uncialis</i>	1.328 \pm 0.692	0.008 \pm 0.004	0.014 \pm 0.005	0.000 \pm 0.000	0.018 \pm 0.005	0.000 \pm 0.000	0.022 \pm 0.006	0.000 \pm 0.000
<i>Dactylina arctica</i>	0.000 \pm 0.000	0.156 \pm 0.063	1.286 \pm 0.592	0.202 \pm 0.093	0.008 \pm 0.003	0.002 \pm 0.002	0.012 \pm 0.005	0.000 \pm 0.000
<i>Flavocetraria cucullata</i>	0.120 \pm 0.065	0.008 \pm 0.004	0.000 \pm 0.000	0.000 \pm 0.000	0.760 \pm 0.516	0.072 \pm 0.044	0.362 \pm 0.215	0.528 \pm 0.401
<i>Flavocetraria nivalis</i>	0.020 \pm 0.020	0.002 \pm 0.002	1.484 \pm 0.302	0.214 \pm 0.046	0.260 \pm 0.078	0.122 \pm 0.032	0.350 \pm 0.080	0.122 \pm 0.043
<i>Nephroma arcticum</i>	0.000 \pm 0.000	0.000 \pm 0.000	1.164 \pm 0.618	0.120 \pm 0.038	0.062 \pm 0.044	0.024 \pm 0.020	0.086 \pm 0.063	0.052 \pm 0.028
<i>Nephroma exaltitum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera aphthosa</i>	1.554 \pm 0.408	0.044 \pm 0.007	0.828 \pm 0.289	0.076 \pm 0.034	1.846 \pm 0.521	0.654 \pm 0.206	1.828 \pm 0.559	0.654 \pm 0.306
<i>Peltigera leucophlebia</i>	0.462 \pm 0.280	0.000 \pm 0.000	0.060 \pm 0.044	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera malacea</i>	3.254 \pm 0.710	0.034 \pm 0.007	2.648 \pm 0.767	0.214 \pm 0.067	4.386 \pm 0.721	0.628 \pm 0.221	2.006 \pm 0.507	0.342 \pm 0.122
<i>Peltigera neopolydactyla</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera retifoveata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera rufescens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera scabrosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pertusaria dactylina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solorina crocea</i>	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Stereocaulon tomentosum</i>	0.368 \pm 0.191	0.008 \pm 0.004	0.390 \pm 0.221	0.100 \pm 0.048	0.746 \pm 0.510	0.084 \pm 0.063	0.414 \pm 0.158	0.084 \pm 0.044

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 3.5 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial lichen species for winter harvested sites of Stand 2.

Lichens:	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Cetraria ericetorum</i>	0.086 \pm 0.028	0.028 \pm 0.006	0.060 \pm 0.007	0.010 \pm 0.004	0.030 \pm 0.007	0.036 \pm 0.007	0.110 \pm 0.027	0.098 \pm 0.027
<i>Cetraria islandica</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.002 \pm 0.002
<i>Cladonia mitis</i>	14.502 \pm 2.234	3.350 \pm 0.568	22.622 \pm 2.332	5.924 \pm 0.892	14.226 \pm 2.902	12.330 \pm 2.769	23.260 \pm 2.397	17.360 \pm 2.002
<i>Cladonia rangiferina</i>	10.042 \pm 1.999	1.852 \pm 0.335	8.208 \pm 1.724	2.782 \pm 0.557	4.528 \pm 1.148	3.732 \pm 1.083	10.726 \pm 2.179	8.722 \pm 1.732
<i>Cladonia stellaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.060 \pm 0.060	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia amaroecraea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia borealis</i>	0.004 \pm 0.003	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.006 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia botrytes</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002
<i>Cladonia carneola</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cenotea</i>	0.034 \pm 0.020	0.008 \pm 0.004	0.034 \pm 0.020	0.004 \pm 0.003	0.028 \pm 0.020	0.010 \pm 0.004	0.030 \pm 0.007	0.008 \pm 0.004
<i>Cladonia cervicornis</i> subsp. <i>verticillata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002
<i>Cladonia chlorophaea</i>	0.018 \pm 0.005	0.006 \pm 0.003	0.016 \pm 0.005	0.002 \pm 0.002	0.026 \pm 0.006	0.004 \pm 0.003	0.084 \pm 0.060	0.002 \pm 0.002
<i>Cladonia confocraea</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia cornuta</i>	0.780 \pm 0.142	0.096 \pm 0.044	0.448 \pm 0.095	0.032 \pm 0.007	0.636 \pm 0.143	0.774 \pm 0.147	0.856 \pm 0.122	0.718 \pm 0.111
<i>Cladonia crispata</i>	1.228 \pm 0.313	0.114 \pm 0.065	1.152 \pm 0.233	0.054 \pm 0.028	1.132 \pm 0.256	0.990 \pm 0.229	1.174 \pm 0.245	1.070 \pm 0.223
<i>Cladonia deformis</i>	0.130 \pm 0.047	0.040 \pm 0.005	0.164 \pm 0.049	0.048 \pm 0.007	0.164 \pm 0.067	0.176 \pm 0.060	0.144 \pm 0.041	0.152 \pm 0.050
<i>Cladonia emocyna</i>	4.630 \pm 0.681	2.062 \pm 0.340	8.068 \pm 0.967	2.738 \pm 0.858	5.736 \pm 1.058	7.468 \pm 1.200	4.228 \pm 0.708	5.086 \pm 0.703
<i>Cladonia fimbriata</i>	0.076 \pm 0.020	0.014 \pm 0.005	0.074 \pm 0.020	0.022 \pm 0.006	0.038 \pm 0.007	0.042 \pm 0.007	0.054 \pm 0.007	0.166 \pm 0.067
<i>Cladonia furcata</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia gracilis</i>	0.292 \pm 0.121	0.032 \pm 0.020	0.760 \pm 0.210	0.048 \pm 0.028	0.388 \pm 0.127	0.150 \pm 0.070	0.680 \pm 0.167	0.194 \pm 0.061
<i>Cladonia grayi</i>	0.012 \pm 0.005	0.000 \pm 0.000	0.018 \pm 0.005	0.000 \pm 0.000	0.018 \pm 0.005	0.014 \pm 0.005	0.020 \pm 0.006	0.004 \pm 0.003
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia multifomis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia pyxidata</i>	0.010 \pm 0.004	0.000 \pm 0.000	0.012 \pm 0.005	0.000 \pm 0.000	0.004 \pm 0.003	0.006 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia sulphurina</i>	0.026 \pm 0.020	0.006 \pm 0.003	0.002 \pm 0.002	0.006 \pm 0.003	0.002 \pm 0.002	0.010 \pm 0.004	0.036 \pm 0.020	0.002 \pm 0.002
<i>Cladonia uncialis</i>	3.424 \pm 1.763	0.644 \pm 0.232	0.942 \pm 0.399	0.580 \pm 0.153	0.784 \pm 0.602	1.684 \pm 1.027	1.008 \pm 0.624	0.012 \pm 0.005
<i>Dactylina arctica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.146 \pm 0.644
<i>Flavocetraria cucullata</i>	0.388 \pm 0.104	0.036 \pm 0.007	0.198 \pm 0.076	0.046 \pm 0.007	0.062 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Flavocetraria nivalis</i>	0.062 \pm 0.034	0.024 \pm 0.020	0.084 \pm 0.063	0.008 \pm 0.004	0.004 \pm 0.003	0.020 \pm 0.020	0.112 \pm 0.048	0.142 \pm 0.050
<i>Nephroma arcticum</i>	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.060 \pm 0.044	0.028 \pm 0.020
<i>Nephroma expallidum</i>	3.544 \pm 0.780	0.616 \pm 0.401	1.110 \pm 0.327	0.300 \pm 0.163	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera aphthosa</i>	0.370 \pm 0.302	0.000 \pm 0.000	0.042 \pm 0.040	0.002 \pm 0.002	2.712 \pm 0.549	2.228 \pm 0.530	2.386 \pm 0.722	1.164 \pm 0.313
<i>Peltigera malacea</i>	4.510 \pm 0.966	0.200 \pm 0.109	2.266 \pm 0.498	0.134 \pm 0.051	0.064 \pm 0.044	0.040 \pm 0.040	0.320 \pm 0.155	0.020 \pm 0.020
<i>Peltigera neopolydactyla</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	4.612 \pm 1.181	1.918 \pm 0.672	3.250 \pm 0.811	1.930 \pm 0.481
<i>Peltigera retifoveata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.300 \pm 0.300	0.200 \pm 0.200	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera rufescens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera scabrosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pertusaria dactylina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solorina crocea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Stereocaulon tomentosum</i>	0.200 \pm 0.121	0.042 \pm 0.028	1.244 \pm 0.772	0.068 \pm 0.044	0.064 \pm 0.044	0.102 \pm 0.100	0.228 \pm 0.119	0.184 \pm 0.072

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 3.6 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial lichen species for control sites of Stand 2.

Lichens:	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Cetraria ericetorum</i>	0.546 \pm 0.139	0.522 \pm 0.114	0.366 \pm 0.096	0.322 \pm 0.070	0.148 \pm 0.036	0.094 \pm 0.019	0.078 \pm 0.028	0.056 \pm 0.020
<i>Cetraria islandica</i>	0.044 \pm 0.040	0.068 \pm 0.060	0.060 \pm 0.044	0.026 \pm 0.020	0.022 \pm 0.020	0.002 \pm 0.002	0.000 \pm 0.000	0.004 \pm 0.003
<i>Cladonia mitis</i>	15.746 \pm 2.598	15.468 \pm 2.664	22.486 \pm 3.020	20.302 \pm 3.020	21.386 \pm 2.401	19.606 \pm 2.284	11.962 \pm 1.890	12.508 \pm 2.124
<i>Cladonia rangiferina</i>	0.160 \pm 0.116	0.220 \pm 0.170	0.508 \pm 0.500	0.424 \pm 0.400	3.610 \pm 1.542	3.634 \pm 1.417	2.646 \pm 0.789	2.888 \pm 0.847
<i>Cladonia stellaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia amaroceae</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia borealis</i>	0.014 \pm 0.005	0.030 \pm 0.020	0.010 \pm 0.004	0.014 \pm 0.005	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia botrytes</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia carneola</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cenotea</i>	0.154 \pm 0.061	0.082 \pm 0.044	0.052 \pm 0.040	0.038 \pm 0.020	0.012 \pm 0.005	0.030 \pm 0.020	0.034 \pm 0.020	0.012 \pm 0.005
<i>Cladonia cervicornis</i> subsp. <i>verticillata</i>	0.098 \pm 0.063	0.146 \pm 0.073	0.046 \pm 0.028	0.086 \pm 0.063	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000
<i>Cladonia chlorophaea</i>	0.002 \pm 0.002	0.050 \pm 0.028	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.008 \pm 0.004	0.004 \pm 0.003	0.002 \pm 0.002
<i>Cladonia contocraea</i>	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000	0.004 \pm 0.003	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cornuta</i>	1.326 \pm 0.217	0.916 \pm 0.151	0.782 \pm 0.186	0.686 \pm 0.163	0.682 \pm 0.155	0.762 \pm 0.186	0.502 \pm 0.106	0.422 \pm 0.110
<i>Cladonia crispata</i>	0.692 \pm 0.251	0.892 \pm 0.354	1.056 \pm 0.338	0.850 \pm 0.242	1.282 \pm 0.416	1.526 \pm 0.419	0.550 \pm 0.121	0.690 \pm 0.152
<i>Cladonia deformis</i>	0.054 \pm 0.020	0.032 \pm 0.007	0.088 \pm 0.044	0.068 \pm 0.040	0.082 \pm 0.028	0.088 \pm 0.034	0.034 \pm 0.020	0.080 \pm 0.060
<i>Cladonia emocyna</i>	3.584 \pm 0.935	4.280 \pm 1.008	2.026 \pm 0.461	2.012 \pm 0.444	3.022 \pm 0.563	3.402 \pm 0.675	2.596 \pm 0.384	3.018 \pm 0.450
<i>Cladonia fimbriata</i>	0.094 \pm 0.044	0.040 \pm 0.007	0.026 \pm 0.006	0.038 \pm 0.007	0.090 \pm 0.027	0.090 \pm 0.027	0.022 \pm 0.006	0.030 \pm 0.007
<i>Cladonia furcata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia gracilis</i>	0.950 \pm 0.245	1.138 \pm 0.279	1.058 \pm 0.239	1.082 \pm 0.227	0.424 \pm 0.116	0.882 \pm 0.164	0.134 \pm 0.101	0.196 \pm 0.105
<i>Cladonia grayi</i>	0.004 \pm 0.003	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000	0.008 \pm 0.004	0.008 \pm 0.004	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia multifomis</i>	0.002 \pm 0.002	0.002 \pm 0.002	0.022 \pm 0.020	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia pyxidata</i>	0.024 \pm 0.006	0.026 \pm 0.006	0.022 \pm 0.006	0.024 \pm 0.006	0.010 \pm 0.004	0.006 \pm 0.003	0.012 \pm 0.005	0.002 \pm 0.002
<i>Cladonia sulphurina</i>	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.008 \pm 0.004	0.004 \pm 0.003
<i>Cladonia uncialis</i>	0.020 \pm 0.122	0.144 \pm 0.076	0.582 \pm 0.502	0.582 \pm 0.502	1.642 \pm 0.622	1.404 \pm 0.546	1.624 \pm 0.936	1.486 \pm 0.889
<i>Dactylina arctica</i>	0.020 \pm 0.020	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Flavocetraria cucullata</i>	1.590 \pm 0.614	1.216 \pm 0.545	1.714 \pm 0.556	1.280 \pm 0.507	0.772 \pm 0.175	0.608 \pm 0.152	0.330 \pm 0.134	0.166 \pm 0.069
<i>Flavocetraria nivalis</i>	0.322 \pm 0.222	0.220 \pm 0.122	0.010 \pm 0.004	0.008 \pm 0.004	0.122 \pm 0.074	0.100 \pm 0.065	0.100 \pm 0.100	0.062 \pm 0.060
<i>Nephroma arcticum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Nephroma expallidum</i>	0.220 \pm 0.170	0.160 \pm 0.116	0.200 \pm 0.121	0.260 \pm 0.173	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera aphthosa</i>	0.474 \pm 0.314	0.712 \pm 0.508	0.246 \pm 0.109	0.208 \pm 0.103	1.162 \pm 0.350	1.104 \pm 0.361	0.080 \pm 0.063	0.120 \pm 0.102
<i>Peltigera leucophlebia</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	8.886 \pm 1.487	6.610 \pm 1.415
<i>Peltigera malacea</i>	5.706 \pm 0.931	6.228 \pm 0.958	5.244 \pm 0.810	3.684 \pm 0.571	4.706 \pm 0.909	5.148 \pm 1.025	0.024 \pm 0.020	0.024 \pm 0.020
<i>Peltigera neopolydactyla</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera retifoveata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera rufescens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera scabrosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pertusaria dactylina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solorina crocea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Stereocaulon tomentosum</i>	1.012 \pm 0.408	0.572 \pm 0.225	4.752 \pm 1.586	4.314 \pm 1.449	9.806 \pm 2.825	9.244 \pm 2.782	1.006 \pm 0.609	0.866 \pm 0.511

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 3.7 Pre- and post-harvest percent covers (+/- S.E.) of terrestrial lichen species for summer harvested sites of Stand 3.

Lichens:	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Cetraria ericetorum</i>	0.234 +/- 0.056	0.058 +/- 0.007	0.102 +/- 0.019	0.050 +/- 0.007	0.094 +/- 0.019	0.060 +/- 0.007	0.106 +/- 0.027	0.076 +/- 0.020
<i>Cetraria islandica</i>	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.004 +/- 0.003	0.000 +/- 0.000
<i>Cladonia mitis</i>	25.764 +/- 2.519	2.570 +/- 0.381	14.542 +/- 1.751	2.774 +/- 0.558	16.602 +/- 1.852	7.768 +/- 1.619	13.982 +/- 1.724	6.680 +/- 1.081
<i>Cladonia rangiferina</i>	1.668 +/- 0.629	0.370 +/- 0.172	8.748 +/- 2.006	1.984 +/- 0.718	2.226 +/- 0.716	1.644 +/- 0.469	7.352 +/- 1.825	3.860 +/- 1.091
<i>Cladonia stellaris</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia amaroaerana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia bowalis</i>	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.008 +/- 0.004	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000
<i>Cladonia botrytes</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000
<i>Cladonia carneola</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia cuneata</i>	0.042 +/- 0.020	0.000 +/- 0.000	0.068 +/- 0.028	0.006 +/- 0.003	0.034 +/- 0.020	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia cervicornis</i> subsp. <i>verticillata</i>	0.006 +/- 0.003	0.000 +/- 0.000	0.002 +/- 0.002	0.006 +/- 0.003	0.000 +/- 0.000	0.002 +/- 0.002	0.020 +/- 0.006	0.006 +/- 0.003
<i>Cladonia chlorophaea</i>	0.166 +/- 0.049	0.000 +/- 0.000	0.050 +/- 0.020	0.002 +/- 0.002	0.116 +/- 0.033	0.012 +/- 0.005	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia confocraea</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.066 +/- 0.020	0.000 +/- 0.000
<i>Cladonia comata</i>	1.282 +/- 0.229	0.034 +/- 0.007	0.536 +/- 0.108	0.028 +/- 0.006	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000
<i>Cladonia crispata</i>	2.482 +/- 0.357	0.178 +/- 0.077	1.032 +/- 0.223	0.156 +/- 0.070	1.154 +/- 0.189	0.510 +/- 0.123	1.148 +/- 0.204	0.378 +/- 0.084
<i>Cladonia deformis</i>	0.358 +/- 0.119	0.052 +/- 0.007	0.178 +/- 0.071	0.028 +/- 0.006	0.148 +/- 0.041	0.092 +/- 0.020	1.126 +/- 0.223	0.272 +/- 0.098
<i>Cladonia emocyma</i>	5.148 +/- 0.728	0.560 +/- 0.121	4.754 +/- 0.713	0.870 +/- 0.195	6.114 +/- 0.799	4.096 +/- 0.507	0.256 +/- 0.078	0.066 +/- 0.020
<i>Cladonia fimbriata</i>	0.024 +/- 0.006	0.022 +/- 0.006	0.052 +/- 0.007	0.012 +/- 0.005	0.038 +/- 0.007	0.042 +/- 0.007	5.146 +/- 0.766	2.442 +/- 0.544
<i>Cladonia furcata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.048 +/- 0.007	0.036 +/- 0.007
<i>Cladonia gracilis</i>	0.896 +/- 0.187	0.020 +/- 0.006	0.642 +/- 0.141	0.066 +/- 0.044	0.812 +/- 0.261	0.154 +/- 0.075	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia grayi</i>	0.006 +/- 0.003	0.000 +/- 0.000	0.008 +/- 0.004	0.000 +/- 0.000	0.004 +/- 0.003	0.000 +/- 0.000	0.840 +/- 0.198	0.140 +/- 0.046
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.018 +/- 0.005	0.000 +/- 0.000
<i>Cladonia multifomis</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia pyxidata</i>	0.046 +/- 0.020	0.004 +/- 0.003	0.022 +/- 0.020	0.000 +/- 0.000	0.006 +/- 0.003	0.004 +/- 0.003	0.002 +/- 0.002	0.000 +/- 0.000
<i>Cladonia sulphurina</i>	0.000 +/- 0.000	0.002 +/- 0.002	0.002 +/- 0.002	0.004 +/- 0.003	0.010 +/- 0.004	0.000 +/- 0.000	0.008 +/- 0.004	0.000 +/- 0.000
<i>Cladonia uncialis</i>	2.586 +/- 1.070	0.350 +/- 0.107	1.046 +/- 0.354	0.496 +/- 0.190	1.004 +/- 0.537	1.176 +/- 0.803	0.470 +/- 0.236	0.594 +/- 0.233
<i>Dactylina arectica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.002 +/- 0.002
<i>Flavocetraria cucullata</i>	0.400 +/- 0.123	0.050 +/- 0.007	0.336 +/- 0.096	0.030 +/- 0.000	0.244 +/- 0.081	0.044 +/- 0.007	0.450 +/- 0.116	0.122 +/- 0.043
<i>Flavocetraria nivalis</i>	0.008 +/- 0.004	0.052 +/- 0.040	0.040 +/- 0.040	0.004 +/- 0.003	0.004 +/- 0.003	0.008 +/- 0.004	0.044 +/- 0.040	0.020 +/- 0.006
<i>Nephroma arectum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Nephroma expallidum</i>	1.222 +/- 0.451	0.030 +/- 0.007	1.748 +/- 0.454	0.184 +/- 0.055	1.126 +/- 0.380	0.316 +/- 0.125	1.538 +/- 0.500	0.520 +/- 0.185
<i>Peltigera aphthosa</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.022 +/- 0.020	0.000 +/- 0.000	0.322 +/- 0.150	0.020 +/- 0.020
<i>Peltigera leucophaea</i>	4.768 +/- 0.849	0.130 +/- 0.047	5.804 +/- 1.016	0.500 +/- 0.300	3.282 +/- 0.555	0.378 +/- 0.107	3.524 +/- 0.628	0.612 +/- 0.146
<i>Peltigera neopolydactyla</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Peltigera retifoveata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Peltigera rufescens</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Peltigera scabra</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pertusaria dactylina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Solorina crocea</i>	0.048 +/- 0.028	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.022 +/- 0.020	0.000 +/- 0.000	0.002 +/- 0.002	0.002 +/- 0.002
<i>Stereocaulon tomentosum</i>	2.514 +/- 0.868	0.154 +/- 0.067	0.970 +/- 0.444	0.054 +/- 0.020	0.506 +/- 0.229	0.152 +/- 0.064	0.732 +/- 0.264	0.248 +/- 0.140

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 3.8 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial lichen species for winter harvested sites of Stand 3.

Lichens:	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Cetraria ericetorum</i>	0.098 \pm 0.019	0.054 \pm 0.007	0.130 \pm 0.032	0.038 \pm 0.007	0.096 \pm 0.019	0.060 \pm 0.007	0.128 \pm 0.028	0.080 \pm 0.006
<i>Cetraria islandica</i>	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia mitis</i>	12.982 \pm 1.496	6.342 \pm 0.859	13.970 \pm 1.770	5.482 \pm 0.901	20.522 \pm 2.278	14.322 \pm 1.994	22.620 \pm 2.262	12.560 \pm 1.793
<i>Cladonia rangiferina</i>	6.724 \pm 1.489	2.264 \pm 0.362	4.524 \pm 1.432	1.402 \pm 0.455	3.506 \pm 1.264	2.464 \pm 0.795	4.746 \pm 1.333	3.150 \pm 0.956
<i>Cladonia stellaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia amaroceae</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia borealis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.008 \pm 0.004	0.000 \pm 0.000	0.004 \pm 0.003	0.002 \pm 0.002
<i>Cladonia bostrytes</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia carneola</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cenotea</i>	0.044 \pm 0.020	0.008 \pm 0.004	0.018 \pm 0.005	0.006 \pm 0.003	0.048 \pm 0.020	0.004 \pm 0.003	0.010 \pm 0.004	0.002 \pm 0.002
<i>Cladonia cervicornis</i> subsp. <i>verticillata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.042 \pm 0.028	0.022 \pm 0.020
<i>Cladonia chlorophaea</i>	0.036 \pm 0.020	0.000 \pm 0.000	0.090 \pm 0.027	0.004 \pm 0.003	0.008 \pm 0.004	0.000 \pm 0.000	0.002 \pm 0.002	0.006 \pm 0.003
<i>Cladonia coniocraea</i>	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia cornuta</i>	0.536 \pm 0.154	0.060 \pm 0.020	0.386 \pm 0.075	0.090 \pm 0.033	0.706 \pm 0.122	0.318 \pm 0.081	1.014 \pm 0.145	0.494 \pm 0.103
<i>Cladonia crispata</i>	0.750 \pm 0.157	0.304 \pm 0.117	1.138 \pm 0.235	0.256 \pm 0.108	1.144 \pm 0.192	0.418 \pm 0.127	1.620 \pm 0.253	0.920 \pm 0.192
<i>Cladonia deformis</i>	0.120 \pm 0.032	0.058 \pm 0.007	0.150 \pm 0.041	0.052 \pm 0.007	0.172 \pm 0.066	0.086 \pm 0.028	0.164 \pm 0.057	0.080 \pm 0.020
<i>Cladonia ecmocyna</i>	3.984 \pm 0.594	2.880 \pm 0.433	4.638 \pm 0.951	2.394 \pm 0.418	9.440 \pm 1.195	7.304 \pm 0.922	6.584 \pm 0.989	5.786 \pm 0.874
<i>Cladonia fimbriata</i>	0.092 \pm 0.027	0.024 \pm 0.006	0.078 \pm 0.020	0.014 \pm 0.005	0.070 \pm 0.007	0.086 \pm 0.020	0.098 \pm 0.019	0.072 \pm 0.020
<i>Cladonia furcata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia gracilis</i>	0.774 \pm 0.154	0.048 \pm 0.028	0.724 \pm 0.150	0.132 \pm 0.061	0.782 \pm 0.171	0.026 \pm 0.020	0.720 \pm 0.168	0.274 \pm 0.093
<i>Cladonia grayi</i>	0.006 \pm 0.003	0.000 \pm 0.000	0.010 \pm 0.004	0.000 \pm 0.000	0.028 \pm 0.020	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia multiformis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cladonia pyxidata</i>	0.008 \pm 0.004	0.006 \pm 0.003	0.010 \pm 0.004	0.000 \pm 0.000	0.006 \pm 0.003	0.002 \pm 0.002	0.008 \pm 0.004	0.004 \pm 0.003
<i>Cladonia sulphurina</i>	0.014 \pm 0.005	0.002 \pm 0.002	0.006 \pm 0.003	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.004 \pm 0.003
<i>Cladonia uncialis</i>	0.388 \pm 0.195	0.518 \pm 0.189	0.666 \pm 0.285	0.282 \pm 0.115	0.244 \pm 0.126	0.380 \pm 0.191	1.542 \pm 0.725	1.128 \pm 0.559
<i>Dactylina arctica</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.040 \pm 0.040	0.020 \pm 0.020
<i>Flavocetraria cucullata</i>	0.184 \pm 0.105	0.050 \pm 0.007	0.248 \pm 0.114	0.104 \pm 0.044	0.850 \pm 0.199	0.326 \pm 0.207	0.984 \pm 0.252	0.496 \pm 0.182
<i>Flavocetraria nivalis</i>	0.006 \pm 0.003	0.004 \pm 0.003	0.062 \pm 0.044	0.026 \pm 0.020	0.044 \pm 0.028	0.044 \pm 0.028	0.026 \pm 0.020	0.032 \pm 0.020
<i>Nephroma arcticum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Nephroma expallidum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera aphthosa</i>	1.784 \pm 0.428	0.524 \pm 0.119	2.422 \pm 0.875	0.710 \pm 0.226	1.054 \pm 0.301	0.750 \pm 0.218	0.492 \pm 0.232	0.208 \pm 0.099
<i>Peltigera leucophaea</i>	0.180 \pm 0.117	0.040 \pm 0.040	0.402 \pm 0.202	0.100 \pm 0.100	0.120 \pm 0.084	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera malacea</i>	3.888 \pm 0.828	0.660 \pm 0.136	7.500 \pm 1.556	1.224 \pm 0.452	5.466 \pm 0.837	1.628 \pm 0.327	4.164 \pm 0.801	1.692 \pm 0.333
<i>Peltigera neopolydactyla</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera retifoveata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera rufescens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Peltigera scabrosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pertusaria dactylina</i>	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solorina crocea</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002
<i>Stereocaulon tomentosum</i>	0.690 \pm 0.601	0.094 \pm 0.048	0.668 \pm 0.275	0.148 \pm 0.073	0.886 \pm 0.386	0.170 \pm 0.087	0.860 \pm 0.247	0.438 \pm 0.106

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 3.9 Pre- and post-harvest percent covers (+/- S.E.) of terrestrial lichen species for control sites of Stand 3.

Lichens:	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Cetraria ericetorum</i>	0.230 +/- 0.056	0.214 +/- 0.101	0.134 +/- 0.047	0.144 +/- 0.064	0.120 +/- 0.032	0.106 +/- 0.027	0.106 +/- 0.027	0.166 +/- 0.049
<i>Cetraria islandica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.004 +/- 0.003	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia mitis</i>	14.988 +/- 2.587	16.868 +/- 2.894	8.260 +/- 1.758	6.852 +/- 1.541	12.980 +/- 1.689	15.424 +/- 1.986	19.004 +/- 2.558	16.264 +/- 2.545
<i>Cladonia rangiferina</i>	1.202 +/- 0.722	1.420 +/- 0.796	1.200 +/- 0.849	1.162 +/- 0.848	2.004 +/- 0.383	2.550 +/- 0.556	0.722 +/- 0.241	0.624 +/- 0.221
<i>Cladonia stellaris</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia amaurocraea</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia borealis</i>	0.010 +/- 0.004	0.012 +/- 0.005	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia botrytes</i>	0.002 +/- 0.002	0.004 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.014 +/- 0.005	0.016 +/- 0.005
<i>Cladonia carniola</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.004 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002
<i>Cladonia cenotea</i>	0.098 +/- 0.038	0.164 +/- 0.075	0.100 +/- 0.038	0.076 +/- 0.034	0.026 +/- 0.006	0.020 +/- 0.006	0.002 +/- 0.002	0.000 +/- 0.000
<i>Cladonia cervicornis</i> subsp. <i>vericillata</i>	0.002 +/- 0.002	0.008 +/- 0.004	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.020 +/- 0.000	0.012 +/- 0.005	0.016 +/- 0.005
<i>Cladonia chlorophaea</i>	0.038 +/- 0.020	0.012 +/- 0.005	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.088 +/- 0.063	0.048 +/- 0.040
<i>Cladonia coniocraea</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.002 +/- 0.002	0.034 +/- 0.007	0.000 +/- 0.000	0.002 +/- 0.002	0.006 +/- 0.003
<i>Cladonia cornuta</i>	0.702 +/- 0.146	0.706 +/- 0.157	1.036 +/- 0.207	0.002 +/- 0.002	0.004 +/- 0.003	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia crispata</i>	0.918 +/- 0.288	1.008 +/- 0.312	0.254 +/- 0.123	0.688 +/- 0.160	0.524 +/- 0.122	0.532 +/- 0.099	0.660 +/- 0.133	0.346 +/- 0.087
<i>Cladonia deformis</i>	0.100 +/- 0.033	0.106 +/- 0.048	0.112 +/- 0.062	0.282 +/- 0.125	1.072 +/- 0.228	1.022 +/- 0.247	1.094 +/- 0.234	0.848 +/- 0.176
<i>Cladonia emocynia</i>	2.436 +/- 0.525	2.456 +/- 0.617	4.282 +/- 0.767	0.094 +/- 0.044	0.144 +/- 0.058	0.158 +/- 0.067	0.140 +/- 0.047	0.100 +/- 0.027
<i>Cladonia fimbriata</i>	0.112 +/- 0.033	0.144 +/- 0.050	0.118 +/- 0.062	4.408 +/- 0.798	2.772 +/- 0.446	3.518 +/- 0.565	3.556 +/- 1.251	3.174 +/- 1.033
<i>Cladonia furcata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.100 +/- 0.044	0.066 +/- 0.020	0.050 +/- 0.007	0.068 +/- 0.007	0.060 +/- 0.007
<i>Cladonia gracilis</i>	0.796 +/- 0.197	0.856 +/- 0.242	0.762 +/- 0.241	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia grayi</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.010 +/- 0.004	0.926 +/- 0.276	0.614 +/- 0.188	0.698 +/- 0.169	0.608 +/- 0.197	0.782 +/- 0.153
<i>Cladonia macilenta</i> var. <i>bacillaris</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.010 +/- 0.004	0.006 +/- 0.003	0.014 +/- 0.005	0.012 +/- 0.005
<i>Cladonia multiformis</i>	0.020 +/- 0.020	0.004 +/- 0.003	0.062 +/- 0.034	0.120 +/- 0.055	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cladonia pyxidata</i>	0.022 +/- 0.006	0.020 +/- 0.006	0.004 +/- 0.003	0.004 +/- 0.003	0.010 +/- 0.004	0.008 +/- 0.004	0.026 +/- 0.006	0.006 +/- 0.004
<i>Cladonia sulphurina</i>	0.002 +/- 0.002	0.000 +/- 0.000	0.004 +/- 0.003	0.002 +/- 0.002	0.006 +/- 0.003	0.006 +/- 0.003	0.006 +/- 0.003	0.008 +/- 0.004
<i>Cladonia uncialis</i>	0.060 +/- 0.044	0.060 +/- 0.044	0.284 +/- 0.208	0.262 +/- 0.173	1.786 +/- 0.557	2.044 +/- 0.648	0.060 +/- 0.060	0.060 +/- 0.060
<i>Dactylina arctica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Flavocetraria cucullata</i>	0.298 +/- 0.130	0.180 +/- 0.082	0.194 +/- 0.068	0.102 +/- 0.048	0.344 +/- 0.131	0.278 +/- 0.128	0.726 +/- 0.225	0.240 +/- 0.108
<i>Flavocetraria nivalis</i>	0.102 +/- 0.100	0.100 +/- 0.100	0.020 +/- 0.020	0.020 +/- 0.020	0.224 +/- 0.201	0.204 +/- 0.164	0.102 +/- 0.100	0.064 +/- 0.060
<i>Nephroma arcticum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Nephroma expallidum</i>	0.004 +/- 0.003	0.022 +/- 0.020	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Peltigera aphlosa</i>	0.284 +/- 0.178	0.380 +/- 0.225	2.054 +/- 0.775	1.330 +/- 0.401	2.674 +/- 0.721	3.708 +/- 0.985	2.722 +/- 0.889	1.724 +/- 0.588
<i>Peltigera leucophaea</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.022 +/- 0.020	0.040 +/- 0.028	0.004 +/- 0.003	0.100 +/- 0.100
<i>Peltigera malacea</i>	5.984 +/- 1.191	7.770 +/- 1.718	7.108 +/- 1.472	6.148 +/- 1.396	6.122 +/- 0.916	7.944 +/- 1.201	10.486 +/- 1.782	8.124 +/- 1.447
<i>Peltigera neopolydactyla</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Peltigera retifoveata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Peltigera rufescens</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.300 +/- 0.300	0.500 +/- 0.500
<i>Peltigera scabrosa</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Perusaria dactylina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Solorina crocea</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.042 +/- 0.040	0.080 +/- 0.063
<i>Stereocaulon tomentosum</i>	1.194 +/- 0.528	1.092 +/- 0.487	1.112 +/- 0.392	0.788 +/- 0.273	8.776 +/- 2.884	9.476 +/- 2.778	4.776 +/- 1.761	4.074 +/- 1.582

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.1 Pre- and post-harvest percent covers (\pm S.E.) of tree and shrub species for summer harvested sites of Stand 1.

	S1		S2		S3		S4	
Trees:	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Abies lasiocarpa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Picea mariana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.900 \pm 0.584	0.000 \pm 0.000
<i>Pinus contorta</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.064 \pm 0.060	0.000 \pm 0.000	0.222 \pm 0.141	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	0.160 \pm 0.160	0.000 \pm 0.000	1.062 \pm 0.640	0.000 \pm 0.000	1.020 \pm 0.483	0.002 \pm 0.002	0.100 \pm 0.100	0.000 \pm 0.000
<i>Betula glandulosa</i>	0.244 \pm 0.203	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	1.840 \pm 0.964	0.202 \pm 0.200	0.000 \pm 0.000	0.000 \pm 0.000
<i>Empetrum nigrum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Ledum groenlandicum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Limnaea borealis</i>	0.600 \pm 0.331	0.002 \pm 0.002	0.622 \pm 0.360	0.000 \pm 0.000	0.060 \pm 0.044	0.022 \pm 0.020	0.080 \pm 0.063	0.000 \pm 0.000
<i>Rosa acicularis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Rubus arcticus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Salix fariniae</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium caespitosum</i>	7.240 \pm 1.301	0.064 \pm 0.040	3.584 \pm 0.908	0.046 \pm 0.040	8.360 \pm 1.682	1.340 \pm 0.452	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium myrtillus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	1.960 \pm 0.566	0.154 \pm 0.070
<i>Vaccinium vitis-idaea</i>	6.940 \pm 0.751	0.014 \pm 0.005	9.180 \pm 1.593	0.178 \pm 0.115	8.740 \pm 1.329	0.148 \pm 0.036	0.000 \pm 0.000	0.000 \pm 0.000
							11.960 \pm 1.246	0.174 \pm 0.063

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.2 Pre- and post-harvest percent covers (\pm S.E.) of tree and shrub species for winter harvested sites of Stand 1.

	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Trees:								
<i>Abies lasiocarpa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.022 \pm 0.020	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000
<i>Picea mariana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pinus contorta</i>	0.102 \pm 0.100	0.002 \pm 0.002	1.004 \pm 1.000	0.000 \pm 0.000	0.022 \pm 0.020	0.020 \pm 0.020	0.022 \pm 0.020	0.004 \pm 0.003
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	0.780 \pm 0.497	0.002 \pm 0.002	0.020 \pm 0.020	0.000 \pm 0.000	2.160 \pm 1.337	1.920 \pm 1.291	0.160 \pm 0.160	0.000 \pm 0.000
<i>Betula glandulosa</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Empetrum nigrum</i>	0.400 \pm 0.400	0.000 \pm 0.000	1.760 \pm 0.975	0.000 \pm 0.000	0.100 \pm 0.100	0.002 \pm 0.002	1.580 \pm 0.883	0.260 \pm 0.187
<i>Ledum groenlandicum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Linnaea borealis</i>	1.084 \pm 0.508	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.104 \pm 0.100	0.002 \pm 0.002	0.062 \pm 0.044	0.002 \pm 0.002
<i>Rosa acicularis</i>	0.040 \pm 0.040	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.220 \pm 0.165	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Rubus arcticus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Salix laricina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.100 \pm 0.100	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium caespitosum</i>	2.930 \pm 0.789	0.200 \pm 0.084	2.202 \pm 0.713	0.058 \pm 0.028	5.800 \pm 0.975	1.198 \pm 0.282	1.104 \pm 0.365	0.080 \pm 0.044
<i>Vaccinium myrtillus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium vitis-idaea</i>	9.600 \pm 0.802	0.218 \pm 0.086	14.140 \pm 1.589	0.330 \pm 0.116	13.860 \pm 2.222	1.904 \pm 0.510	14.820 \pm 1.525	2.460 \pm 0.452

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.3 Pre- and post-harvest percent covers (+/- S.E.) of tree and shrub species for control sites of Stand 1.

	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Trees:								
<i>Abies lasiocarpa</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Picea mariana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.062 +/- 0.060	0.004 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000	0.060 +/- 0.060	0.600 +/- 0.600
<i>Pinus contorta</i>	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.108 +/- 0.071	0.124 +/- 0.074
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.240 +/- 0.201	0.160 +/- 0.160	0.000 +/- 0.000	0.000 +/- 0.000
<i>Betula glandulosa</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.364 +/- 0.305	0.122 +/- 0.084
<i>Empetrum nigrum</i>	5.622 +/- 1.242	5.966 +/- 1.256	3.130 +/- 1.277	2.812 +/- 1.271	1.840 +/- 0.880	1.260 +/- 0.681	1.200 +/- 1.200	1.600 +/- 1.600
<i>Ledum groenlandicum</i>	1.740 +/- 0.804	1.760 +/- 0.837	1.100 +/- 0.491	0.800 +/- 0.336	0.460 +/- 0.337	0.400 +/- 0.280	0.400 +/- 0.400	0.300 +/- 0.300
<i>Limnosa borealis</i>	0.168 +/- 0.108	0.224 +/- 0.104	0.000 +/- 0.000	0.002 +/- 0.002	1.362 +/- 0.330	1.450 +/- 0.414	0.160 +/- 0.160	0.400 +/- 0.400
<i>Rosa acicularis</i>	0.042 +/- 0.040	0.022 +/- 0.020	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Rubus arcticus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Salix farctica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Vaccinium caespitosum</i>	12.180 +/- 1.828	17.404 +/- 2.175	4.846 +/- 0.740	14.224 +/- 2.112	4.700 +/- 0.806	6.684 +/- 1.121	2.586 +/- 0.788	4.328 +/- 1.207
<i>Vaccinium myrtillus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.400 +/- 0.400	0.400 +/- 0.400	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Vaccinium vitis-idaea</i>	8.260 +/- 1.097	8.940 +/- 1.291	13.482 +/- 1.170	9.666 +/- 1.088	4.360 +/- 0.551	4.004 +/- 0.650	16.720 +/- 2.609	12.444 +/- 2.491

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.4 Pre- and post-harvest percent covers (\pm S.E.) of tree and shrub species for summer harvested sites of Stand 2.

	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Trees:								
<i>Abies lasiocarpa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Picea mariana</i>	0.042 \pm 0.040	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pinus contorta</i>	0.060 \pm 0.060	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.040 \pm 0.040	0.060 \pm 0.060	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Betula glandulosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Empetrum nigrum</i>	0.060 \pm 0.060	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.800 \pm 0.800	0.040 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lesium groenlandicum</i>	0.200 \pm 0.200	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.300 \pm 0.300	0.040 \pm 0.040
<i>Linnaea borealis</i>	0.740 \pm 0.439	0.000 \pm 0.000	0.720 \pm 0.268	0.000 \pm 0.000	0.082 \pm 0.039	0.002 \pm 0.002	0.020 \pm 0.020	0.000 \pm 0.000
<i>Rosa acicularis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	1.228 \pm 0.304	0.072 \pm 0.060
<i>Rubus arcticus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Salix farriacae</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.060 \pm 0.060	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium caespitosum</i>	4.024 \pm 0.865	0.110 \pm 0.062	1.300 \pm 0.577	0.010 \pm 0.004	2.952 \pm 0.615	0.282 \pm 0.120	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium myrtillus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	4.462 \pm 0.920	0.654 \pm 0.304
<i>Vaccinium vitis-idaea</i>	6.520 \pm 0.604	0.032 \pm 0.007	20.660 \pm 2.228	0.584 \pm 0.401	10.320 \pm 1.176	0.410 \pm 0.124	0.000 \pm 0.000	0.000 \pm 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.5 Pre- and post-harvest percent covers (\pm S.E.) of tree and shrub species for winter harvested sites of Stand 2.

	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Trees:								
<i>Abies lasiocarpa</i>	0.040 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Picea mariana</i>	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pinus contorta</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Betula glandulosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Empetrum nigrum</i>	1.664 \pm 1.120	0.002 \pm 0.002	0.100 \pm 0.100	0.000 \pm 0.000	1.002 \pm 1.000	0.162 \pm 0.160	0.000 \pm 0.000	0.000 \pm 0.000
<i>Ledum groenlandicum</i>	0.300 \pm 0.300	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.300 \pm 0.300	0.002 \pm 0.002
<i>Linnaea borealis</i>	0.082 \pm 0.044	0.000 \pm 0.000	0.302 \pm 0.174	0.000 \pm 0.000	0.506 \pm 0.206	0.008 \pm 0.004	1.388 \pm 0.575	0.012 \pm 0.005
<i>Rosa acicularis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Rubus arcticus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Salix farriacae</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium caespitosum</i>	4.642 \pm 0.834	0.054 \pm 0.020	4.206 \pm 0.902	0.156 \pm 0.101	2.662 \pm 0.701	0.670 \pm 0.246	4.542 \pm 1.310	1.242 \pm 0.542
<i>Vaccinium myrtillus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium vitis-idaea</i>	6.720 \pm 0.454	0.122 \pm 0.047	7.600 \pm 0.668	0.146 \pm 0.064	7.740 \pm 1.090	1.050 \pm 0.224	8.080 \pm 0.920	1.370 \pm 0.333

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.6 Pre- and post-harvest percent covers (\pm S.E.) of tree and shrub species for control sites of Stand 2.

	C1		C2		C3		C4	
Trees:	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Abies lasiocarpa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Picea mariana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.160 \pm 0.160	0.200 \pm 0.200	0.000 \pm 0.000	0.000 \pm 0.000	0.202 \pm 0.164	0.100 \pm 0.100
<i>Pinus contorta</i>	0.650 \pm 0.331	0.428 \pm 0.210	2.204 \pm 1.003	1.768 \pm 0.861	0.100 \pm 0.071	0.104 \pm 0.071	0.050 \pm 0.044	0.062 \pm 0.044
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	0.782 \pm 0.445	0.440 \pm 0.259	0.560 \pm 0.502	0.220 \pm 0.170	0.000 \pm 0.000	0.000 \pm 0.000	0.600 \pm 0.600	0.600 \pm 0.600
<i>Betula glandulosa</i>	0.188 \pm 0.117	0.324 \pm 0.135	0.010 \pm 0.004	0.014 \pm 0.005	0.664 \pm 0.261	0.844 \pm 0.377	0.808 \pm 0.607	0.844 \pm 0.606
<i>Empetrum nigrum</i>	0.400 \pm 0.400	0.400 \pm 0.400	0.000 \pm 0.000	0.000 \pm 0.000	0.760 \pm 0.618	0.700 \pm 0.606	0.600 \pm 0.600	0.800 \pm 0.800
<i>Ledum groenlandicum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Limnosa borealis</i>	0.000 \pm 0.000	0.000 \pm 0.000	3.280 \pm 1.568	3.642 \pm 1.683	0.580 \pm 0.407	0.440 \pm 0.308	1.022 \pm 0.369	1.722 \pm 0.562
<i>Rosa acicularis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Rubus arcticus</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.102 \pm 0.100	0.180 \pm 0.161	0.000 \pm 0.000	0.002 \pm 0.002
<i>Salix farriac</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium caespitosum</i>	1.744 \pm 0.671	2.862 \pm 0.854	2.124 \pm 0.549	5.364 \pm 1.397	9.440 \pm 1.495	13.622 \pm 2.240	4.700 \pm 1.287	4.740 \pm 1.223
<i>Vaccinium myrtillus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium vitis-idaea</i>	16.360 \pm 1.959	16.000 \pm 2.400	13.382 \pm 1.856	11.286 \pm 1.938	14.640 \pm 1.688	9.446 \pm 2.035	18.284 \pm 2.853	17.140 \pm 2.907

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.7 Pre- and post-harvest percent covers (\pm S.E.) of tree and shrub species for summer harvested sites of Stand 3.

	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Trees:								
<i>Abies lasiocarpa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Picea mariana</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.020 \pm 0.020
<i>Pinus contorta</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.006 \pm 0.003	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.460 \pm 0.246	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Betula glandulosa</i>	0.122 \pm 0.102	0.040 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000	0.222 \pm 0.201	0.082 \pm 0.063	0.044 \pm 0.040	0.040 \pm 0.040
<i>Empetrum nigrum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.160 \pm 0.160	0.000 \pm 0.000	1.320 \pm 0.888	0.206 \pm 0.200	0.200 \pm 0.200	0.002 \pm 0.002
<i>Ledum groenlandicum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.160 \pm 0.160	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Linnaea borealis</i>	0.160 \pm 0.160	0.000 \pm 0.000	0.306 \pm 0.188	0.000 \pm 0.000	0.300 \pm 0.210	0.022 \pm 0.020	0.040 \pm 0.028	0.002 \pm 0.002
<i>Rosa acicularis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Rubus arcticus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Salix farriacae</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium caespitosum</i>	3.386 \pm 0.989	0.058 \pm 0.028	8.924 \pm 1.560	0.074 \pm 0.028	10.122 \pm 1.503	0.676 \pm 0.158	11.604 \pm 1.609	0.928 \pm 0.218
<i>Vaccinium myrtillus</i>	0.100 \pm 0.100	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium vitis-idaea</i>	9.042 \pm 1.360	0.104 \pm 0.033	8.820 \pm 0.870	0.098 \pm 0.033	6.422 \pm 0.746	0.524 \pm 0.139	7.420 \pm 0.702	0.480 \pm 0.099

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.8 Pre- and post-harvest percent covers (\pm S.E.) of tree and shrub species for winter harvested sites of Stand 3.

	W1		W2		W3		W4	
Trees:	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Abies lasiocarpa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Picea mariana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pinus contorta</i>	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.006 \pm 0.003	0.004 \pm 0.003
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	0.120 \pm 0.102	0.000 \pm 0.000	0.160 \pm 0.160	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002
<i>Betula glandulosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.020 \pm 0.020
<i>Empetrum nigrum</i>	0.140 \pm 0.107	0.002 \pm 0.002	1.380 \pm 0.860	0.042 \pm 0.040	0.300 \pm 0.300	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000
<i>Ledum groenlandicum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Limnæa borealis</i>	0.122 \pm 0.074	0.000 \pm 0.000	5.920 \pm 1.754	0.030 \pm 0.020	1.340 \pm 1.006	0.526 \pm 0.410	0.182 \pm 0.113	0.000 \pm 0.000
<i>Rosa acicularis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003
<i>Rubus arcticus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Salix laricina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium caespitosum</i>	8.820 \pm 1.440	0.184 \pm 0.077	5.022 \pm 1.052	0.136 \pm 0.065	2.342 \pm 0.601	0.126 \pm 0.051	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium myrtillus</i>	0.120 \pm 0.102	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	6.002 \pm 1.261	0.622 \pm 0.135
<i>Vaccinium vitis-idaea</i>	8.420 \pm 1.605	0.508 \pm 0.183	6.520 \pm 0.710	0.324 \pm 0.103	9.220 \pm 0.648	1.176 \pm 0.194	0.020 \pm 0.020	0.000 \pm 0.000
							10.600 \pm 0.617	0.922 \pm 0.145

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.9 Pre- and post-harvest percent covers (\pm S.E.) of tree and shrub species for control sites of Stand 3.

	C1		C2		C3		C4	
Trees:	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Abies lasiocarpa</i>	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Picea mariana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.040 \pm 0.040	0.020 \pm 0.020	0.060 \pm 0.060	0.060 \pm 0.060	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pinus contorta</i>	0.044 \pm 0.040	0.044 \pm 0.040	0.100 \pm 0.100	0.080 \pm 0.060	0.002 \pm 0.002	0.002 \pm 0.002	0.064 \pm 0.044	0.046 \pm 0.040
Shrubs:								
<i>Arctostaphylos uva-ursi</i>	2.242 \pm 0.883	1.702 \pm 0.624	1.802 \pm 0.789	1.500 \pm 0.644	0.400 \pm 0.230	0.480 \pm 0.285	1.302 \pm 0.777	1.380 \pm 0.839
<i>Betula glandulosa</i>	0.260 \pm 0.173	0.320 \pm 0.195	0.062 \pm 0.060	0.060 \pm 0.044	0.000 \pm 0.000	0.000 \pm 0.000	0.060 \pm 0.060	0.300 \pm 0.300
<i>Empetrum nigrum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.600 \pm 0.600	0.400 \pm 0.400	0.480 \pm 0.337	0.480 \pm 0.337	0.320 \pm 0.300	0.140 \pm 0.107
<i>Ledum groenlandicum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.100 \pm 0.100	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Limnæa borealis</i>	4.284 \pm 1.224	5.420 \pm 1.687	3.804 \pm 1.403	4.224 \pm 1.534	0.344 \pm 0.222	0.364 \pm 0.224	1.740 \pm 0.880	1.682 \pm 0.898
<i>Rosa acicularis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.020 \pm 0.020	0.000 \pm 0.000	0.060 \pm 0.044
<i>Rubus arcticus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000
<i>Salix farriæ</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002
<i>Vaccinium caespitosum</i>	3.648 \pm 1.183	5.690 \pm 1.904	5.228 \pm 1.411	7.282 \pm 1.990	5.262 \pm 1.124	7.600 \pm 1.690	2.460 \pm 0.765	3.380 \pm 0.915
<i>Vaccinium myrtillus</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Vaccinium vitis-idaea</i>	9.680 \pm 1.214	10.982 \pm 1.874	13.020 \pm 2.054	11.406 \pm 2.259	9.420 \pm 1.028	9.340 \pm 1.162	21.380 \pm 2.727	21.000 \pm 2.949

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.10 Pre- and post-harvest percent covers (+/- S.E.) of herbaceous species for summer harvested sites of Stand 1.

	S1		S2		S3		S4	
Forbs:	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Achillea millefolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aconitum delphinifolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.022 +/- 0.020	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000
<i>Agoseris glauca</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Antennaria parviflora</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.020 +/- 0.020	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Arnica cordifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aster sibiricus</i>	0.182 +/- 0.160	0.000 +/- 0.000	0.182 +/- 0.093	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000
<i>Campanula rotundifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.006 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000
<i>Circaea alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cornus canadensis</i>	0.180 +/- 0.089	0.000 +/- 0.000	0.362 +/- 0.110	0.008 +/- 0.004	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Crepis tectorum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.020 +/- 0.020	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000
<i>Epilobium angustifolium</i>	0.004 +/- 0.003	0.000 +/- 0.000	0.042 +/- 0.028	0.000 +/- 0.000	0.042 +/- 0.040	0.062 +/- 0.044	0.002 +/- 0.002	0.004 +/- 0.003
<i>Fragaria virginiana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Galium boreale</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.044 +/- 0.028	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Hedysarum alpinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Orthilia secunda</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pedicularis labradorica</i>	0.020 +/- 0.020	0.000 +/- 0.000	0.052 +/- 0.028	0.002 +/- 0.002	0.102 +/- 0.100	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000
<i>Petasites palmatus</i>	0.468 +/- 0.157	0.026 +/- 0.020	1.724 +/- 0.548	0.068 +/- 0.034	0.040 +/- 0.040	0.022 +/- 0.020	0.020 +/- 0.020	0.004 +/- 0.003
<i>Potentilla diversifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pyrola chlorantha</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Solidago spathulata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.100 +/- 0.071	0.002 +/- 0.002	0.068 +/- 0.060	0.004 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000
<i>Stellaria crassifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.022 +/- 0.020	0.002 +/- 0.002	0.020 +/- 0.020
<i>Veronica alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Viola adunca</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
Graminoids:								
<i>Agrostis scabra</i>	0.014 +/- 0.005	0.000 +/- 0.000	0.026 +/- 0.020	0.000 +/- 0.000	0.008 +/- 0.004	0.002 +/- 0.002	0.048 +/- 0.040	0.000 +/- 0.000
<i>Danthonia californica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.010 +/- 0.004	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000
<i>Deschampsia caespitosa</i>	0.002 +/- 0.002	0.000 +/- 0.000	0.004 +/- 0.003	0.000 +/- 0.000	0.010 +/- 0.004	0.006 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000
<i>Elymus innovatus</i>	0.010 +/- 0.004	0.002 +/- 0.002	0.046 +/- 0.020	0.014 +/- 0.005	0.036 +/- 0.007	0.034 +/- 0.007	0.050 +/- 0.020	0.020 +/- 0.006
<i>Festuca saximontana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Orzopsis pungens</i>	0.020 +/- 0.006	0.002 +/- 0.002	0.068 +/- 0.034	0.004 +/- 0.003	0.048 +/- 0.040	0.010 +/- 0.004	0.000 +/- 0.000	0.044 +/- 0.040
Clubmosses & Horsetails:								
<i>Equisetum scirpoides</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.004 +/- 0.003	0.000 +/- 0.000	0.006 +/- 0.003	0.000 +/- 0.000
<i>Lycopodium annotinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Lycopodium complanatum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.11 Pre- and post-harvest percent covers (\pm S.E.) of herbaceous plant species for winter harvested sites of Stand 1.

Forbs:	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Achillea millefolium</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.060 \pm 0.060	0.040 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000
<i>Aconitum delphinifolium</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Agoseris glauca</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Antennaria parviflora</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.060 \pm 0.060	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000
<i>Arnica cordifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Aster sibiricus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Campanula rotundifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Circaea alpina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cornus canadensis</i>	0.244 \pm 0.088	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Crepis tectorum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.144 \pm 0.076	0.000 \pm 0.000
<i>Epilobium angustifolium</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Fragaria virginiana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.124 \pm 0.074	0.024 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000
<i>Galium boreale</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Hedysarum alpinum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Orthilia secunda</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pedicularis labradorica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.028 \pm 0.020	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Petasites palmatus</i>	0.002 \pm 0.002	0.004 \pm 0.003	0.260 \pm 0.187	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.006 \pm 0.003	0.000 \pm 0.000
<i>Potentilla diversifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pyrola chlorantha</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solidago spathulata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Stellaria crassifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Veronica alpina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Viola adunca</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.042 \pm 0.040	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
Graminoids:								
<i>Agrostis scabra</i>	0.012 \pm 0.005	0.004 \pm 0.003	0.030 \pm 0.007	0.000 \pm 0.000	0.090 \pm 0.063	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000
<i>Danthonia californica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Deschampsia caespitosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Elymus innovatus</i>	0.008 \pm 0.004	0.000 \pm 0.000	0.016 \pm 0.005	0.012 \pm 0.005	0.038 \pm 0.020	0.010 \pm 0.004	0.006 \pm 0.003	0.004 \pm 0.003
<i>Festuca saximontana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Oryzopsis pungens</i>	0.020 \pm 0.020	0.006 \pm 0.003	0.144 \pm 0.066	0.026 \pm 0.006	0.002 \pm 0.002	0.016 \pm 0.005	0.000 \pm 0.000	0.006 \pm 0.003
Clubmosses & Horsetails:								
<i>Equisetum scirpoides</i>	0.034 \pm 0.020	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.042 \pm 0.020	0.006 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lycopodium annotinum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lycopodium complanatum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.12 Pre- and post-harvest percent covers (+/- S.E.) of herbaceous plant species for control sites of Stand 1.

	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Forbs:								
<i>Achillea millefolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aconitum delphinifolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Agoseris glauca</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Antennaria parviflora</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aniica cordifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aster sibiricus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.120 +/- 0.102	0.000 +/- 0.000	0.000 +/- 0.000
<i>Campanula rotundifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.022 +/- 0.020	0.042 +/- 0.040
<i>Circea alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cornus canadensis</i>	0.596 +/- 0.175	1.068 +/- 0.319	0.000 +/- 0.000	0.630 +/- 0.158	3.124 +/- 0.312	3.284 +/- 0.328	0.000 +/- 0.000	0.000 +/- 0.000
<i>Crepis tectorum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.140 +/- 0.107	0.140 +/- 0.107
<i>Eupatorium angustifolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Fragaria virginiana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.042 +/- 0.040	0.004 +/- 0.003	0.020 +/- 0.020	0.062 +/- 0.044
<i>Galium boreale</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Hedysarum alpinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Orthilia secunda</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pedicularis labradorica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Petasites palmatus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.020 +/- 0.020	0.040 +/- 0.040	0.000 +/- 0.000	0.000 +/- 0.000
<i>Potentilla diversifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.060 +/- 0.044	0.004 +/- 0.003	0.022 +/- 0.020	0.044 +/- 0.028
<i>Pyrola chlorantha</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Solidago spathulata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Stellaria crassifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.042 +/- 0.040	0.042 +/- 0.040
<i>Veronica alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Viola adunca</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
Grainuloids:								
<i>Agrostis scabra</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.010 +/- 0.004	0.000 +/- 0.000	0.054 +/- 0.020	0.000 +/- 0.000
<i>Danthonia californica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Deschampsia caespitosa</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Elymus innovatus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.020 +/- 0.006	0.018 +/- 0.005	0.018 +/- 0.005	0.028 +/- 0.006
<i>Festuca saximontana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Oryzopsis pungens</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.008 +/- 0.004	0.000 +/- 0.000	0.030 +/- 0.007
Clubmosses & Horsetails:								
<i>Equisetum setpoides</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.042 +/- 0.040	0.000 +/- 0.000	0.000 +/- 0.000	0.006 +/- 0.003	0.004 +/- 0.003
<i>Lycopodium annotinum</i>	0.280 +/- 0.206	0.064 +/- 0.060	0.000 +/- 0.000	0.000 +/- 0.000	0.100 +/- 0.100	0.060 +/- 0.060	0.000 +/- 0.000	0.000 +/- 0.000
<i>Lycopodium complanatum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.102 +/- 0.100	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.13 Pre- and post-harvest percent covers (+/- S.E.) of herbaceous plant species for summer harvested sites of Stand 2.

	S1		S2		S3		S4	
Forbs:	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Achillea millefolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aconitum delphinifolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Agoseris glauca</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Antennaria parviflora</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Arnica cordifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aster sibiricus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Campanula rotundifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Circaea alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.008 +/- 0.004	0.004 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cornus canadensis</i>	2.228 +/- 0.308	0.056 +/- 0.040	0.000 +/- 0.005	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Crepis tectorum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.646 +/- 0.193	0.002 +/- 0.002	2.154 +/- 0.397	0.158 +/- 0.103	2.412 +/- 0.407	0.016 +/- 0.005
<i>Epilobium angustifolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Fragaria virginiana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.062 +/- 0.060	0.004 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Galium boreale</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Hedysarum alpinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Orthilia secunda</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pedicularis labradorica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Petasites palmatus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.084 +/- 0.083	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Potentilla diversifolia</i>	0.002 +/- 0.002	0.000 +/- 0.000	0.304 +/- 0.149	0.104 +/- 0.100	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pyrola chlorantha</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Solidago spathulata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.008 +/- 0.004	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Stellaria crassifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Veronica alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Viola adunca</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
Graminoids:								
<i>Agrostis scabra</i>	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000
<i>Danthonia californica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Deschampsia caespitosa</i>	0.006 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Elymus innovatus</i>	0.002 +/- 0.002	0.000 +/- 0.000	0.048 +/- 0.020	0.026 +/- 0.006	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.004 +/- 0.003
<i>Festuca saximontana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Orzopsis pungens</i>	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.012 +/- 0.005
Clubmosses & Horsetails:								
<i>Equisetum scirpoides</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Lycopodium annotinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.040 +/- 0.040	0.060 +/- 0.060	0.060 +/- 0.060	0.000 +/- 0.000
<i>Lycopodium complanatum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.14 Pre- and post-harvest percent covers (\pm S.E.) of herbaceous plant species for winter harvested sites of Stand 2.

	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Forbs:								
<i>Achillea millefolium</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Aconitum delphinifolium</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Agoseris glauca</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Antennaria parviflora</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Arnica cordifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Aster sibiricus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Campanula rotundifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Circaea alpina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cornus canadensis</i>	1.646 \pm 0.299	0.002 \pm 0.002	1.744 \pm 0.237	0.008 \pm 0.004	1.758 \pm 0.268	0.084 \pm 0.044	1.830 \pm 0.275	0.028 \pm 0.020
<i>Crepis tectorum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Epilobium angustifolium</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Fragaria virginiana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Galium boreale</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Hedysarum alpinum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Orethlia secunda</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pedicularis labradorica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Petasites palmatus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Potentilla diversifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pyrola chlorantha</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solidago spatulata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Stellaria crassifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Veronica alpina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Viola adunca</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Graminoids:								
<i>Agrostis scabra</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.006 \pm 0.003	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
<i>Danthonia californica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Deschampsia caespitosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Elymus innovatus</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002	0.004 \pm 0.003	0.044 \pm 0.040	0.004 \pm 0.003
<i>Festuca saximontana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Oryzopsis pungens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.010 \pm 0.004	0.000 \pm 0.000	0.006 \pm 0.003
Clubmosses & Horsetails:								
<i>Equisetum scirpoides</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.082 \pm 0.063	0.004 \pm 0.003	0.016 \pm 0.005	0.006 \pm 0.003
<i>Lycopodium annotinum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.100 \pm 0.100	0.000 \pm 0.000	0.142 \pm 0.076	0.222 \pm 0.119	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lycopodium complanatum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.15 Pre- and post-harvest percent covers (\pm S.E.) of herbaceous plant species for control sites of Stand 2.

	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Forbs:								
<i>Achillea millefolium</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002
<i>Aconitum delphinifolium</i>	0.002 \pm 0.002	0.006 \pm 0.003	0.006 \pm 0.003	0.024 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Agoseris glauca</i>	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Antennaria parviflora</i>	0.002 \pm 0.002	0.002 \pm 0.002	0.022 \pm 0.020	0.024 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Arnica cordifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Aster sibiricus</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.044 \pm 0.040	0.220 \pm 0.201	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Campanula rotundifolia</i>	0.004 \pm 0.003	0.004 \pm 0.003	0.008 \pm 0.004	0.012 \pm 0.005	0.002 \pm 0.002	0.002 \pm 0.002	0.004 \pm 0.003	0.006 \pm 0.003
<i>Circaea alpina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cornus canadensis</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Crepis tectorum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	1.458 \pm 0.262	3.802 \pm 0.873
<i>Epilobium angustifolium</i>	0.034 \pm 0.020	0.206 \pm 0.090	0.032 \pm 0.020	0.300 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Fragaria virginiana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.128 \pm 0.084	0.024 \pm 0.020	0.024 \pm 0.020	0.006 \pm 0.003	0.062 \pm 0.034
<i>Galium boreale</i>	0.008 \pm 0.004	0.026 \pm 0.020	0.028 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Hedysarum alpinum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Orthilia secunda</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pedicularis labradorica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Petasites palmatus</i>	0.058 \pm 0.028	0.250 \pm 0.123	0.106 \pm 0.071	0.186 \pm 0.089	0.008 \pm 0.004	0.048 \pm 0.040	0.198 \pm 0.093	0.722 \pm 0.239
<i>Potentilla diversifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.020 \pm 0.020
<i>Pyrola chlorantha</i>	0.004 \pm 0.003	0.042 \pm 0.028	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solidago spathulata</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.084 \pm 0.056	0.182 \pm 0.108	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002
<i>Stellaria crassifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Veronica alpina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Viola adunca</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.022 \pm 0.020	0.022 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000
Graminoids:								
<i>Agrostis scabra</i>	0.034 \pm 0.007	0.002 \pm 0.002	0.228 \pm 0.120	0.002 \pm 0.002	0.094 \pm 0.060	0.000 \pm 0.000	0.014 \pm 0.005	0.000 \pm 0.000
<i>Danthonia californica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.162 \pm 0.108	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Deschampsia caespitosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Elymus inovatus</i>	0.054 \pm 0.007	0.086 \pm 0.020	0.094 \pm 0.060	0.078 \pm 0.020	0.026 \pm 0.006	0.030 \pm 0.007	0.036 \pm 0.007	0.042 \pm 0.007
<i>Festuca saximontana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Oryzopsis pungens</i>	0.002 \pm 0.002	0.048 \pm 0.020	0.102 \pm 0.071	0.316 \pm 0.147	0.000 \pm 0.000	0.098 \pm 0.060	0.014 \pm 0.005	0.028 \pm 0.006
Clubmosses & Horsetails:								
<i>Equisetum scirpoides</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lycopodium annotinum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lycopodium complanatum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.16 Pre- and post-harvest percent covers (\pm S.E.) of herbaceous plant species for summer harvested sites of Stand 3.

Forbs:	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Achillea millefolium</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Aconitum delphinifolium</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Agoseris glauca</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Antennaria parviflora</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Arnica cordifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Aster sibiricus</i>	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Campanula rotundifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Circaea alpina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Cornus canadensis</i>	0.746 \pm 0.153	0.008 \pm 0.004	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Crepis tectorum</i>	0.000 \pm 0.000	0.000 \pm 0.000	1.390 \pm 0.192	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Epilobium angustifolium</i>	0.024 \pm 0.020	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.154 \pm 0.057	0.000 \pm 0.000
<i>Fragaria virginiana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000
<i>Gallium boreale</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Hedysarum alpinum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Orthilia secunda</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Pedicularis labradorica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Petasites palmatus</i>	0.040 \pm 0.040	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.006 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Potentilla diversifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.122 \pm 0.102	0.044 \pm 0.040	0.002 \pm 0.002	0.002 \pm 0.002
<i>Pyrola elliptica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Solidago spatulata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Stellaria crassifolia</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Veronica alpina</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Viola adunca</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Graminoids:								
<i>Agrostis scabra</i>	0.020 \pm 0.006	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.010 \pm 0.004	0.000 \pm 0.000	0.020 \pm 0.006	0.000 \pm 0.000
<i>Danthonia californica</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Deschampsia caespitosa</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Elymus innovatus</i>	0.036 \pm 0.020	0.012 \pm 0.005	0.016 \pm 0.005	0.002 \pm 0.002	0.010 \pm 0.004	0.002 \pm 0.002	0.006 \pm 0.003	0.004 \pm 0.003
<i>Festuca saximontana</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Oryzopsis pungens</i>	0.050 \pm 0.028	0.014 \pm 0.005	0.000 \pm 0.000	0.002 \pm 0.002	0.020 \pm 0.020	0.008 \pm 0.004	0.000 \pm 0.000	0.016 \pm 0.005
Clubmosses & Horsetails:								
<i>Equisetum scirpoides</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lycopodium annotinum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.022 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lycopodium complanatum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.17 Pre- and post-harvest percent covers (+/- S.E.) of herbaceous plant species for winter harvested sites of Stand 3.

	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Forbs:								
<i>Achillea millefolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aconitum delphinifolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Agoseris glauca</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Antennaria parviflora</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Arnica cordifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aster sibiricus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Campanula rotundifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000
<i>Circaea alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cornus canadensis</i>	1.360 +/- 0.324	0.008 +/- 0.004	0.000 +/- 0.000	0.006 +/- 0.003	0.300 +/- 0.125	0.002 +/- 0.002	0.656 +/- 0.155	0.006 +/- 0.003
<i>Crepis tectorum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Epilobium angustifolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Fragaria virginiana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.042 +/- 0.040	0.000 +/- 0.000
<i>Galium boreale</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Hedysarum alpinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Orthilia secunda</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pedicularis labradorica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.004 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Petasites palmatus</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.020 +/- 0.020	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Potentilla diversifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pyrola chlorantha</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Solidago spathulata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Stellaria crassifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Veronica alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Viola adunca</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
Graminoids:								
<i>Agrostis scabra</i>	0.004 +/- 0.003	0.000 +/- 0.000	0.006 +/- 0.003	0.002 +/- 0.002	0.012 +/- 0.005	0.000 +/- 0.000	0.040 +/- 0.020	0.000 +/- 0.000
<i>Danthonia californica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Deschampsia caespitosa</i>	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Elymus innovatus</i>	0.004 +/- 0.003	0.006 +/- 0.003	0.028 +/- 0.020	0.006 +/- 0.003	0.020 +/- 0.006	0.014 +/- 0.005	0.016 +/- 0.005	0.016 +/- 0.005
<i>Festuca saximontana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Oryzopsis pungens</i>	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.004 +/- 0.003	0.000 +/- 0.000	0.008 +/- 0.004	0.000 +/- 0.000	0.024 +/- 0.006
Clubmosses & Horsetails:								
<i>Equisetum scirpoides</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Lycopodium annotinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Lycopodium complanatum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.18 Pre- and post-harvest percent covers (+/- S.E.) of herbaceous plant species for control sites of Stand 3.

	C1		C2		C3		C4	
Forbs:	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<i>Achillea millefolium</i>	0.004 +/- 0.003	0.004 +/- 0.003	0.008 +/- 0.004	0.010 +/- 0.004	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aconitum delphinifolium</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Agoseris glauca</i>	0.002 +/- 0.002	0.002 +/- 0.002	0.062 +/- 0.044	0.030 +/- 0.020	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Antennaria parviflora</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.044 +/- 0.040	0.000 +/- 0.000
<i>Arnica cordifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Aster sibiricus</i>	0.044 +/- 0.040	0.042 +/- 0.040	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.020 +/- 0.020
<i>Campanula rotundifolia</i>	0.004 +/- 0.003	0.012 +/- 0.005	0.014 +/- 0.005	0.018 +/- 0.005	0.000 +/- 0.000	0.002 +/- 0.002	0.010 +/- 0.004	0.070 +/- 0.060
<i>Circaea alpina</i>	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Cornus canadensis</i>	1.024 +/- 0.458	1.670 +/- 0.677	0.646 +/- 0.213	1.144 +/- 0.332	1.294 +/- 0.248	1.952 +/- 0.297	0.608 +/- 0.164	0.926 +/- 0.256
<i>Crepis tectorum</i>	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Epilobium angustifolium</i>	0.588 +/- 0.191	0.410 +/- 0.187	0.170 +/- 0.077	0.664 +/- 0.238	0.002 +/- 0.002	0.000 +/- 0.000	0.020 +/- 0.020	0.004 +/- 0.003
<i>Fragaria virginiana</i>	0.002 +/- 0.002	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.040 +/- 0.040
<i>Galium boreale</i>	0.068 +/- 0.044	0.048 +/- 0.040	0.062 +/- 0.044	0.092 +/- 0.056	0.000 +/- 0.000	0.000 +/- 0.000	0.004 +/- 0.003	0.060 +/- 0.044
<i>Hedysarum alpinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.160 +/- 0.160	0.160 +/- 0.160
<i>Orthilia secunda</i>	0.002 +/- 0.002	0.022 +/- 0.020	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pedicularis labradorica</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.064 +/- 0.044	0.026 +/- 0.020
<i>Petasites palmatus</i>	0.420 +/- 0.164	0.540 +/- 0.216	0.584 +/- 0.185	1.080 +/- 0.367	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Potentilla diversifolia</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Pyrola chlorantha</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Solidago spatulata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.002 +/- 0.002	0.042 +/- 0.040	0.000 +/- 0.000	0.000 +/- 0.000	0.090 +/- 0.063	0.104 +/- 0.051
<i>Stellaria crassifolia</i>	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Veronica alpina</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Viola adunca</i>	0.028 +/- 0.020	0.040 +/- 0.028	0.040 +/- 0.040	0.100 +/- 0.100	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.004 +/- 0.003
Graminoids:								
<i>Agrostis scabra</i>	0.068 +/- 0.040	0.000 +/- 0.000	0.020 +/- 0.006	0.000 +/- 0.000	0.028 +/- 0.020	0.000 +/- 0.000	0.006 +/- 0.003	0.000 +/- 0.000
<i>Danthonia californica</i>	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Deschampsia caespitosa</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Elymus innovatus</i>	0.080 +/- 0.028	0.046 +/- 0.007	0.058 +/- 0.020	0.104 +/- 0.033	0.026 +/- 0.020	0.012 +/- 0.005	0.048 +/- 0.020	0.052 +/- 0.020
<i>Festuca saximontana</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Oryzopsis pungens</i>	0.004 +/- 0.003	0.028 +/- 0.006	0.000 +/- 0.000	0.022 +/- 0.006	0.000 +/- 0.000	0.010 +/- 0.004	0.100 +/- 0.100	0.110 +/- 0.100
Clubmosses & Horsetails:								
<i>Equisetum scirpoides</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.258 +/- 0.163	0.118 +/- 0.051	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Lycopodium annotinum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Lycopodium complanatum</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.19 Pre- and post-harvest percent covers (+/- S.E.) of terrestrial bryophyte species for summer harvested sites of Stand 1.

	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	0.602 +/- 0.339	0.238 +/- 0.164	0.884 +/- 0.474	0.212 +/- 0.099	1.936 +/- 0.562	0.160 +/- 0.103	1.186 +/- 0.326	0.212 +/- 0.117
<i>Dicranum fuscaceus</i>	3.448 +/- 0.809	1.372 +/- 0.376	1.894 +/- 0.856	0.890 +/- 0.197	2.882 +/- 1.013	0.420 +/- 0.133	4.130 +/- 1.040	2.368 +/- 1.008
<i>Dicranum polysetum</i>	0.128 +/- 0.073	0.004 +/- 0.003	0.020 +/- 0.020	0.020 +/- 0.020	0.164 +/- 0.115	0.000 +/- 0.000	0.040 +/- 0.028	0.000 +/- 0.000
<i>Dicranum sp.</i>	2.310 +/- 0.655	0.000 +/- 0.000	1.894 +/- 0.586	0.000 +/- 0.000	0.202 +/- 0.200	0.000 +/- 0.000	1.002 +/- 0.440	0.002 +/- 0.002
<i>Dicranum undulatum</i>	0.160 +/- 0.116	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.300 +/- 0.300	0.002 +/- 0.002	0.000 +/- 0.000	0.000 +/- 0.000
<i>Hylacomium splendens</i>	0.126 +/- 0.074	0.074 +/- 0.060	0.246 +/- 0.203	0.104 +/- 0.065	0.800 +/- 0.607	0.010 +/- 0.004	1.360 +/- 1.015	0.092 +/- 0.048
<i>Pleurozium schreberi</i>	22.096 +/- 3.657	3.970 +/- 0.910	12.036 +/- 3.082	3.484 +/- 1.372	10.784 +/- 2.950	0.772 +/- 0.421	31.790 +/- 3.924	5.704 +/- 1.912
<i>Pollia nutans</i>	0.280 +/- 0.086	0.012 +/- 0.005	0.552 +/- 0.150	0.058 +/- 0.028	0.446 +/- 0.142	0.228 +/- 0.122	0.580 +/- 0.173	0.320 +/- 0.134
<i>Polytrichum commune</i>	0.102 +/- 0.100	0.000 +/- 0.000	0.046 +/- 0.040	0.000 +/- 0.000	0.006 +/- 0.003	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Polytrichum juniperinum</i>	0.130 +/- 0.065	0.004 +/- 0.003	1.684 +/- 1.256	0.024 +/- 0.006	1.356 +/- 0.355	0.062 +/- 0.020	1.136 +/- 0.462	0.116 +/- 0.043
<i>Polytrichum piliferum</i>	0.004 +/- 0.003	0.000 +/- 0.000	0.066 +/- 0.044	0.002 +/- 0.002	0.048 +/- 0.040	0.008 +/- 0.004	0.000 +/- 0.000	0.000 +/- 0.000
<i>Ptilium crista-castrensis</i>	0.790 +/- 0.431	0.020 +/- 0.006	0.256 +/- 0.116	0.040 +/- 0.020	0.668 +/- 0.264	0.016 +/- 0.005	2.096 +/- 0.797	0.062 +/- 0.020
<i>Sanionia uncinata</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.020 +/- 0.006	0.000 +/- 0.000	0.068 +/- 0.060	0.000 +/- 0.000	0.022 +/- 0.020	0.000 +/- 0.000	0.082 +/- 0.056	0.000 +/- 0.000
<i>Barbilophozia lycopodioides</i>	0.026 +/- 0.006	0.000 +/- 0.000	0.004 +/- 0.003	0.002 +/- 0.002	0.008 +/- 0.004	0.000 +/- 0.000	0.032 +/- 0.020	0.000 +/- 0.000
<i>Lophozia longidens</i>	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000	0.000 +/- 0.000
<i>Lophozia ventricosa</i>	0.082 +/- 0.044	0.000 +/- 0.000	0.376 +/- 0.226	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000	0.002 +/- 0.002	0.000 +/- 0.000
<i>Ptilidium ciliare</i>	0.230 +/- 0.170	0.000 +/- 0.000	0.094 +/- 0.048	0.002 +/- 0.002	0.394 +/- 0.193	0.004 +/- 0.003	2.588 +/- 1.277	0.014 +/- 0.005

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.20 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial bryophyte species for winter harvested sites of Stand 1.

	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	0.082 \pm 0.063	0.396 \pm 0.113	0.748 \pm 0.341	1.596 \pm 0.633	1.580 \pm 0.689	3.024 \pm 0.854	1.782 \pm 0.722	4.384 \pm 1.603
<i>Dicranum fuscescens</i>	4.468 \pm 0.987	1.254 \pm 0.211	5.560 \pm 1.879	0.544 \pm 0.142	7.224 \pm 1.304	3.648 \pm 1.139	9.224 \pm 1.836	7.350 \pm 1.829
<i>Dicranum polysetum</i>	0.162 \pm 0.108	0.000 \pm 0.000	0.264 \pm 0.171	0.006 \pm 0.003	0.068 \pm 0.060	0.002 \pm 0.002	0.120 \pm 0.102	0.000 \pm 0.000
<i>Dicranum</i> sp.	0.842 \pm 0.468	0.000 \pm 0.000	0.128 \pm 0.068	0.080 \pm 0.063	0.000 \pm 0.000	0.000 \pm 0.000	0.960 \pm 0.625	0.000 \pm 0.000
<i>Dicranum undulatum</i>	0.100 \pm 0.100	0.000 \pm 0.000	0.000 \pm 0.000	0.120 \pm 0.102	0.024 \pm 0.020	0.006 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000
<i>Hypnum splendens</i>	0.480 \pm 0.403	0.310 \pm 0.300	0.064 \pm 0.060	0.024 \pm 0.020	1.020 \pm 0.820	0.964 \pm 0.813	0.322 \pm 0.152	0.246 \pm 0.129
<i>Pleurozium schreberi</i>	11.140 \pm 2.983	2.926 \pm 0.895	5.852 \pm 2.046	3.538 \pm 1.196	11.946 \pm 2.871	6.094 \pm 1.978	33.652 \pm 4.667	22.994 \pm 4.173
<i>Pohlia nutans</i>	1.986 \pm 0.445	0.514 \pm 0.144	2.156 \pm 0.388	0.572 \pm 0.179	1.598 \pm 0.278	1.636 \pm 0.421	0.326 \pm 0.114	0.446 \pm 0.186
<i>Polytrichum commune</i>	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000
<i>Polytrichum juniperinum</i>	0.564 \pm 0.219	0.310 \pm 0.169	0.186 \pm 0.161	0.042 \pm 0.020	0.790 \pm 0.511	0.906 \pm 0.799	0.284 \pm 0.097	0.130 \pm 0.051
<i>Polytrichum piliferum</i>	0.064 \pm 0.034	0.046 \pm 0.028	0.110 \pm 0.065	0.006 \pm 0.003	0.008 \pm 0.004	0.002 \pm 0.002	0.002 \pm 0.002	0.002 \pm 0.002
<i>Phluidium cristatense</i>	1.662 \pm 0.990	0.100 \pm 0.063	0.166 \pm 0.103	0.118 \pm 0.065	1.890 \pm 0.848	0.880 \pm 0.446	1.916 \pm 0.568	0.426 \pm 0.144
<i>Sanicula uncinata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.164 \pm 0.104	0.000 \pm 0.000	0.266 \pm 0.127	0.000 \pm 0.000	0.372 \pm 0.224	0.004 \pm 0.003	0.034 \pm 0.020	0.000 \pm 0.000
<i>Barbilophozia lycopodioides</i>	0.198 \pm 0.093	0.004 \pm 0.003	0.040 \pm 0.028	0.002 \pm 0.002	0.042 \pm 0.040	0.070 \pm 0.060	0.154 \pm 0.085	0.042 \pm 0.040
<i>Lophozia longidens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lophozia ventricosa</i>	0.022 \pm 0.006	0.000 \pm 0.000	0.222 \pm 0.085	0.000 \pm 0.000	0.046 \pm 0.028	0.006 \pm 0.003	0.062 \pm 0.028	0.000 \pm 0.000
<i>Platidium ciliare</i>	0.218 \pm 0.114	0.066 \pm 0.044	0.390 \pm 0.191	0.000 \pm 0.000	0.326 \pm 0.179	0.404 \pm 0.306	0.530 \pm 0.216	0.052 \pm 0.040

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.21 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial bryophyte species for control sites of Stand 1.

	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	0.982 \pm 0.311	0.044 \pm 0.028	0.000 \pm 0.000	0.160 \pm 0.087	1.972 \pm 0.872	0.340 \pm 0.191	0.584 \pm 0.252	0.040 \pm 0.040
<i>Dicranum fuscescens</i>	2.858 \pm 0.818	2.804 \pm 0.674	6.012 \pm 1.049	4.492 \pm 0.745	3.826 \pm 0.785	5.300 \pm 1.014	5.006 \pm 1.400	4.310 \pm 1.316
<i>Dicranum polysetum</i>	0.080 \pm 0.063	0.000 \pm 0.000	0.322 \pm 0.224	0.160 \pm 0.160	0.362 \pm 0.254	0.000 \pm 0.000	0.062 \pm 0.060	0.020 \pm 0.020
<i>Dicranum sp.</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.100 \pm 0.071	0.242 \pm 0.129	0.962 \pm 0.442	0.020 \pm 0.020	0.860 \pm 0.441
<i>Dicranum undulatum</i>	0.000 \pm 0.000	0.060 \pm 0.060	0.000 \pm 0.000	0.162 \pm 0.160	0.000 \pm 0.000	0.280 \pm 0.187	0.000 \pm 0.000	0.040 \pm 0.040
<i>Hypnum splendens</i>	0.424 \pm 0.212	0.728 \pm 0.433	0.768 \pm 0.534	0.570 \pm 0.411	1.424 \pm 0.857	2.010 \pm 1.169	0.844 \pm 0.800	0.426 \pm 0.400
<i>Pleurozium schreberi</i>	37.906 \pm 5.233	38.830 \pm 5.466	32.990 \pm 4.421	32.072 \pm 4.546	19.726 \pm 3.840	20.488 \pm 3.705	9.640 \pm 2.341	7.994 \pm 2.000
<i>Pohlia nutans</i>	0.332 \pm 0.135	0.070 \pm 0.060	0.114 \pm 0.047	0.372 \pm 0.097	0.846 \pm 0.268	1.558 \pm 0.451	1.212 \pm 0.280	1.696 \pm 0.370
<i>Polytrichum commune</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Polytrichum juniperinum</i>	0.180 \pm 0.104	0.070 \pm 0.060	0.472 \pm 0.316	0.272 \pm 0.203	0.296 \pm 0.132	0.514 \pm 0.236	1.740 \pm 1.012	1.848 \pm 1.020
<i>Polytrichum piliferum</i>	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002
<i>Ptilium crista-castrensis</i>	1.536 \pm 0.685	1.132 \pm 0.463	1.958 \pm 1.107	1.522 \pm 0.892	1.456 \pm 0.656	1.302 \pm 0.539	0.288 \pm 0.107	0.212 \pm 0.090
<i>Sanionia uncinata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.302 \pm 0.300	0.050 \pm 0.028	0.090 \pm 0.048	0.036 \pm 0.020	0.552 \pm 0.259	1.182 \pm 0.532	0.062 \pm 0.044	0.004 \pm 0.003
<i>Barbilophozia lycopodioides</i>	2.368 \pm 0.677	0.984 \pm 0.240	1.896 \pm 0.495	1.738 \pm 0.522	1.222 \pm 0.250	2.016 \pm 0.403	0.068 \pm 0.034	0.050 \pm 0.028
<i>Lophozia longidens</i>	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lophozia ventricosa</i>	0.174 \pm 0.072	0.134 \pm 0.061	0.046 \pm 0.020	0.040 \pm 0.020	0.018 \pm 0.005	0.062 \pm 0.034	0.042 \pm 0.020	0.010 \pm 0.004
<i>Ptilidium ciliare</i>	0.386 \pm 0.226	0.364 \pm 0.213	0.630 \pm 0.269	0.768 \pm 0.431	0.276 \pm 0.145	0.328 \pm 0.188	1.816 \pm 0.825	2.006 \pm 0.933

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.22 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial bryophyte species for summer harvested sites of Stand 2.

	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	1.020 \pm 0.502	0.158 \pm 0.075	3.204 \pm 1.016	0.476 \pm 0.127	0.402 \pm 0.314	0.042 \pm 0.040	0.520 \pm 0.341	0.304 \pm 0.177
<i>Dicranum fuscescens</i>	5.048 \pm 1.194	0.274 \pm 0.085	2.454 \pm 1.062	1.466 \pm 0.297	9.988 \pm 1.816	5.014 \pm 1.015	8.564 \pm 1.455	2.692 \pm 0.575
<i>Dicranum polysetum</i>	0.042 \pm 0.040	0.004 \pm 0.003	0.042 \pm 0.028	0.004 \pm 0.003	0.002 \pm 0.002	0.000 \pm 0.000	0.102 \pm 0.059	0.000 \pm 0.000
<i>Dicranum sp.</i>	0.646 \pm 0.430	0.000 \pm 0.000	1.040 \pm 0.454	0.002 \pm 0.002	0.400 \pm 0.400	0.060 \pm 0.044	0.082 \pm 0.056	0.000 \pm 0.000
<i>Dicranum undulatum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.040 \pm 0.040	0.000 \pm 0.000	0.040 \pm 0.040	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000
<i>Hypnum splendens</i>	1.982 \pm 1.266	0.210 \pm 0.088	2.162 \pm 0.880	0.628 \pm 0.342	0.108 \pm 0.071	0.008 \pm 0.003	1.180 \pm 1.009	0.014 \pm 0.005
<i>Plagiozium schreberi</i>	24.574 \pm 4.647	4.266 \pm 0.933	16.670 \pm 3.729	5.306 \pm 1.412	30.486 \pm 4.619	9.552 \pm 2.495	21.470 \pm 3.992	3.864 \pm 1.410
<i>Pohlia nutans</i>	0.338 \pm 0.111	0.036 \pm 0.020	0.972 \pm 0.206	0.688 \pm 0.320	0.488 \pm 0.163	0.624 \pm 0.152	0.390 \pm 0.122	0.270 \pm 0.091
<i>Polytrichum commune</i>	0.114 \pm 0.065	0.000 \pm 0.000	0.008 \pm 0.004	0.000 \pm 0.000	0.108 \pm 0.059	0.002 \pm 0.002	0.004 \pm 0.003	0.000 \pm 0.000
<i>Polytrichum juniperinum</i>	3.686 \pm 1.288	0.172 \pm 0.069	0.446 \pm 0.123	0.070 \pm 0.028	0.344 \pm 0.188	0.212 \pm 0.116	0.672 \pm 0.327	0.210 \pm 0.159
<i>Polytrichum piliferum</i>	0.006 \pm 0.003	0.002 \pm 0.002	0.042 \pm 0.028	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000
<i>Phllum erista-castrensis</i>	2.926 \pm 1.669	0.124 \pm 0.062	3.908 \pm 1.957	0.236 \pm 0.110	0.642 \pm 0.247	0.260 \pm 0.201	1.482 \pm 0.636	0.174 \pm 0.102
<i>Sanionia uncinata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.286 \pm 0.111	0.000 \pm 0.000	0.082 \pm 0.048	0.000 \pm 0.000	0.424 \pm 0.241	0.000 \pm 0.000	0.286 \pm 0.204	0.000 \pm 0.000
<i>Barbilophozia lycopodiodes</i>	0.748 \pm 0.197	0.002 \pm 0.002	0.290 \pm 0.110	0.006 \pm 0.003	0.486 \pm 0.171	0.134 \pm 0.101	0.284 \pm 0.097	0.014 \pm 0.005
<i>Lophozia longidens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lophozia ventricosa</i>	0.144 \pm 0.054	0.000 \pm 0.000	0.018 \pm 0.005	0.000 \pm 0.000	0.080 \pm 0.034	0.000 \pm 0.000	0.188 \pm 0.077	0.002 \pm 0.002
<i>Ptilidium ciliare</i>	0.246 \pm 0.165	0.000 \pm 0.000	0.390 \pm 0.139	0.002 \pm 0.002	0.384 \pm 0.189	0.000 \pm 0.000	0.360 \pm 0.112	0.000 \pm 0.000

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.23 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial bryophyte species for winter harvested sites of Stand 2.

	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	0.000 \pm 0.000	0.204 \pm 0.121	0.020 \pm 0.020	0.328 \pm 0.112	0.000 \pm 0.000	0.624 \pm 0.250	0.000 \pm 0.000	1.522 \pm 0.593
<i>Dicranum fuscescens</i>	10.710 \pm 1.924	3.844 \pm 0.572	9.196 \pm 1.813	2.958 \pm 0.506	4.752 \pm 0.849	4.664 \pm 0.841	4.630 \pm 0.856	3.868 \pm 0.936
<i>Dicranum polysetum</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.100 \pm 0.065	0.000 \pm 0.000	0.060 \pm 0.044	0.060 \pm 0.060	0.040 \pm 0.040	0.040 \pm 0.040
<i>Dicranum</i> sp.	0.042 \pm 0.040	0.000 \pm 0.000	0.100 \pm 0.100	0.000 \pm 0.000	0.386 \pm 0.210	0.000 \pm 0.000	0.142 \pm 0.107	0.000 \pm 0.000
<i>Dicranum undulatum</i>	0.060 \pm 0.060	0.000 \pm 0.000	0.000 \pm 0.000	0.042 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Hylacomium splendens</i>	0.840 \pm 0.441	0.096 \pm 0.063	0.208 \pm 0.140	0.080 \pm 0.034	0.902 \pm 0.414	0.110 \pm 0.059	0.144 \pm 0.103	0.108 \pm 0.100
<i>Pleurozium schreberi</i>	36.744 \pm 4.637	12.348 \pm 2.529	34.510 \pm 4.592	6.544 \pm 1.265	46.928 \pm 5.399	35.030 \pm 4.764	25.468 \pm 4.258	23.468 \pm 3.803
<i>Pohlia nutans</i>	0.734 \pm 0.194	0.044 \pm 0.020	0.836 \pm 0.207	0.134 \pm 0.042	0.550 \pm 0.187	0.736 \pm 0.173	1.098 \pm 0.297	0.760 \pm 0.214
<i>Polytrichum commune</i>	0.014 \pm 0.005	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.076 \pm 0.044	0.006 \pm 0.003	0.232 \pm 0.165	0.000 \pm 0.000
<i>Polytrichum juniperinum</i>	0.230 \pm 0.110	0.096 \pm 0.044	0.228 \pm 0.108	0.036 \pm 0.020	0.230 \pm 0.117	0.278 \pm 0.165	0.662 \pm 0.197	0.604 \pm 0.206
<i>Polytrichum piliferum</i>	0.002 \pm 0.002	0.002 \pm 0.002	0.042 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Ptilium crista-castrensis</i>	2.828 \pm 1.380	0.180 \pm 0.056	0.346 \pm 0.179	0.082 \pm 0.034	1.618 \pm 0.817	1.496 \pm 0.725	0.496 \pm 0.234	0.706 \pm 0.412
<i>Sanionia uncinata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.318 \pm 0.121	0.000 \pm 0.000	0.260 \pm 0.112	0.000 \pm 0.000	0.570 \pm 0.339	0.004 \pm 0.003	0.208 \pm 0.085	0.000 \pm 0.000
<i>Barbilophozia lycopodioides</i>	0.808 \pm 0.233	0.004 \pm 0.003	0.934 \pm 0.191	0.082 \pm 0.060	0.580 \pm 0.142	0.480 \pm 0.166	0.538 \pm 0.310	0.090 \pm 0.056
<i>Lophozia longidens</i>	0.002 \pm 0.002	0.000 \pm 0.000	0.006 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lophozia ventricosa</i>	0.122 \pm 0.038	0.000 \pm 0.000	0.378 \pm 0.105	0.000 \pm 0.000	0.154 \pm 0.075	0.026 \pm 0.020	0.066 \pm 0.028	0.010 \pm 0.004
<i>Ptilidium ciliare</i>	0.974 \pm 0.611	0.002 \pm 0.002	0.446 \pm 0.217	0.044 \pm 0.040	0.506 \pm 0.410	0.144 \pm 0.103	0.436 \pm 0.225	0.052 \pm 0.028

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.24 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial bryophyte species for control sites of Stand 2.

	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	0.060 \pm 0.060	0.564 \pm 0.284	0.080 \pm 0.063	0.042 \pm 0.040	0.284 \pm 0.130	0.002 \pm 0.002	0.320 \pm 0.116	0.162 \pm 0.083
<i>Dicranum fuscescens</i>	1.594 \pm 0.560	1.338 \pm 0.521	1.778 \pm 0.508	2.466 \pm 0.672	3.790 \pm 1.156	4.488 \pm 1.222	2.040 \pm 0.475	2.302 \pm 0.506
<i>Dicranum polysetum</i>	0.100 \pm 0.100	0.000 \pm 0.000	0.006 \pm 0.003	0.004 \pm 0.003	0.004 \pm 0.003	0.044 \pm 0.040	0.080 \pm 0.063	0.040 \pm 0.028
<i>Dicranum</i> sp.	0.060 \pm 0.060	0.020 \pm 0.020	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.222 \pm 0.162	0.000 \pm 0.000	0.040 \pm 0.040
<i>Dicranum undulatum</i>	0.000 \pm 0.000	0.100 \pm 0.100	0.022 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.082 \pm 0.063	0.162 \pm 0.116
<i>Hypnum splendens</i>	0.006 \pm 0.003	0.084 \pm 0.048	0.160 \pm 0.108	0.182 \pm 0.117	0.880 \pm 0.800	0.862 \pm 0.800	1.742 \pm 1.425	1.690 \pm 1.256
<i>Pleurozium schreberi</i>	4.264 \pm 2.010	4.076 \pm 2.002	3.622 \pm 1.196	4.070 \pm 1.187	6.706 \pm 2.559	6.246 \pm 2.450	22.154 \pm 3.844	24.832 \pm 4.114
<i>Pohlia nutans</i>	1.836 \pm 0.492	1.970 \pm 0.392	1.778 \pm 0.501	1.800 \pm 0.451	1.050 \pm 0.218	1.758 \pm 0.381	0.898 \pm 0.202	2.052 \pm 0.464
<i>Polytrichum commune</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.020 \pm 0.020	0.022 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.644 \pm 0.600	0.498 \pm 0.403
<i>Polytrichum juniperinum</i>	0.910 \pm 0.529	1.430 \pm 0.821	1.192 \pm 0.570	0.912 \pm 0.458	1.796 \pm 0.673	2.246 \pm 0.787	0.598 \pm 0.195	0.910 \pm 0.422
<i>Polytrichum piliferum</i>	0.284 \pm 0.093	0.322 \pm 0.099	0.190 \pm 0.082	0.084 \pm 0.028	0.044 \pm 0.040	0.042 \pm 0.028	0.002 \pm 0.002	0.002 \pm 0.002
<i>Ptilium crista-castrensis</i>	0.272 \pm 0.145	0.212 \pm 0.114	1.414 \pm 0.696	0.772 \pm 0.343	0.090 \pm 0.063	0.074 \pm 0.060	2.698 \pm 0.880	3.612 \pm 0.987
<i>Sanionia uncinata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.020 \pm 0.020	0.108 \pm 0.100	0.062 \pm 0.060
<i>Barbilophozia lycopodioides</i>	0.068 \pm 0.060	0.024 \pm 0.020	0.062 \pm 0.060	0.144 \pm 0.107	0.704 \pm 0.436	0.446 \pm 0.200	0.330 \pm 0.181	0.676 \pm 0.241
<i>Lophozia longidens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lophozia ventricosa</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.000 \pm 0.000	0.056 \pm 0.028	0.004 \pm 0.003	0.000 \pm 0.000	0.032 \pm 0.020
<i>Ptilidium ciliare</i>	0.284 \pm 0.140	0.266 \pm 0.117	0.474 \pm 0.206	0.270 \pm 0.102	0.900 \pm 0.398	1.234 \pm 0.533	0.434 \pm 0.171	1.024 \pm 0.311

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.25 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial bryophyte species for summer harvested sites of Stand 3.

	S1		S2		S3		S4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	0.520 \pm 0.320	0.012 \pm 0.005	0.186 \pm 0.093	0.058 \pm 0.028	0.122 \pm 0.074	0.004 \pm 0.003	0.380 \pm 0.254	0.040 \pm 0.040
<i>Dicranum flutescens</i>	6.606 \pm 1.779	1.664 \pm 0.463	2.116 \pm 0.618	0.896 \pm 0.278	5.568 \pm 1.186	3.694 \pm 0.807	9.166 \pm 1.754	6.060 \pm 1.452
<i>Dicranum</i> sp.	0.642 \pm 0.339	0.000 \pm 0.000	0.188 \pm 0.161	0.000 \pm 0.000	0.106 \pm 0.071	0.000 \pm 0.000	0.040 \pm 0.040	0.000 \pm 0.000
<i>Dicranum polysetum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.284 \pm 0.208	0.006 \pm 0.003	0.020 \pm 0.020	0.002 \pm 0.002	0.004 \pm 0.003	0.000 \pm 0.000
<i>Dicranum undulatum</i>	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Hylacomium splendens</i>	0.200 \pm 0.200	0.002 \pm 0.002	0.762 \pm 0.618	0.020 \pm 0.006	0.002 \pm 0.002	0.008 \pm 0.004	0.044 \pm 0.040	0.002 \pm 0.002
<i>Pleurozium schreberi</i>	3.538 \pm 1.438	0.398 \pm 0.133	12.622 \pm 3.489	4.662 \pm 1.177	10.148 \pm 2.692	3.738 \pm 1.310	16.074 \pm 3.266	6.476 \pm 1.782
<i>Pohlia nutans</i>	0.978 \pm 0.290	0.170 \pm 0.056	0.782 \pm 0.254	0.124 \pm 0.065	1.910 \pm 0.462	1.426 \pm 0.403	0.682 \pm 0.152	0.366 \pm 0.126
<i>Polytrichum commune</i>	0.024 \pm 0.020	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.022 \pm 0.006	0.004 \pm 0.003	0.070 \pm 0.060	0.000 \pm 0.000
<i>Polytrichum juniperinum</i>	0.690 \pm 0.351	0.036 \pm 0.007	0.068 \pm 0.028	0.022 \pm 0.006	0.390 \pm 0.135	0.172 \pm 0.075	0.232 \pm 0.079	0.108 \pm 0.059
<i>Polytrichum piliferum</i>	0.392 \pm 0.173	0.008 \pm 0.004	0.026 \pm 0.020	0.000 \pm 0.000	0.046 \pm 0.040	0.024 \pm 0.020	0.066 \pm 0.044	0.026 \pm 0.020
<i>Ptilium crista-castrensis</i>	0.206 \pm 0.162	0.004 \pm 0.003	0.246 \pm 0.201	0.588 \pm 0.412	0.814 \pm 0.800	0.188 \pm 0.161	0.810 \pm 0.424	0.238 \pm 0.140
<i>Sanionia uncinata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.062 \pm 0.044	0.000 \pm 0.000	0.146 \pm 0.103	0.000 \pm 0.000	0.182 \pm 0.084	0.000 \pm 0.000	0.068 \pm 0.044	0.000 \pm 0.000
<i>Barbilophozia lycopodioides</i>	0.006 \pm 0.003	0.000 \pm 0.000	0.356 \pm 0.175	0.010 \pm 0.004	0.212 \pm 0.114	0.034 \pm 0.020	2.436 \pm 1.446	0.590 \pm 0.502
<i>Lophozia longidens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lophozia ventricosa</i>	0.014 \pm 0.005	0.000 \pm 0.000	0.170 \pm 0.075	0.002 \pm 0.002	0.322 \pm 0.128	0.000 \pm 0.000	0.114 \pm 0.033	0.000 \pm 0.000
<i>Ptilidium ciliare</i>	0.270 \pm 0.150	0.004 \pm 0.003	0.636 \pm 0.315	0.008 \pm 0.004	0.104 \pm 0.059	0.006 \pm 0.003	0.080 \pm 0.034	0.002 \pm 0.002

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.26 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial bryophyte species for winter harvested sites of Stand 3.

	W1		W2		W3		W4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	0.244 \pm 0.163	0.060 \pm 0.044	0.082 \pm 0.056	0.048 \pm 0.028	0.180 \pm 0.102	0.000 \pm 0.000	0.000 \pm 0.000	0.100 \pm 0.043
<i>Dicranum fuscescens</i>	3.722 \pm 1.023	1.218 \pm 0.311	2.902 \pm 0.704	1.434 \pm 0.212	13.406 \pm 2.427	11.692 \pm 2.139	9.036 \pm 1.893	8.028 \pm 1.780
<i>Dicranum sp.</i>	0.000 \pm 0.000	0.020 \pm 0.020	0.002 \pm 0.002	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Dicranum polysetum</i>	0.242 \pm 0.168	0.122 \pm 0.102	0.204 \pm 0.121	0.046 \pm 0.040	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020	0.002 \pm 0.002
<i>Dicranum undulatum</i>	0.000 \pm 0.000	0.002 \pm 0.002	0.306 \pm 0.300	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.020 \pm 0.020
<i>Hylacomium splendens</i>	0.302 \pm 0.300	0.004 \pm 0.003	1.104 \pm 1.000	0.044 \pm 0.020	1.044 \pm 1.000	0.100 \pm 0.100	0.640 \pm 0.601	0.062 \pm 0.060
<i>Pleurozium schreberi</i>	12.544 \pm 2.987	3.794 \pm 1.397	20.140 \pm 4.106	8.966 \pm 1.960	10.408 \pm 2.798	6.854 \pm 2.535	5.058 \pm 1.924	3.240 \pm 1.539
<i>Pohlia nutans</i>	0.632 \pm 0.227	0.106 \pm 0.048	0.532 \pm 0.144	0.170 \pm 0.080	2.018 \pm 0.344	2.552 \pm 0.493	0.982 \pm 0.178	1.220 \pm 0.271
<i>Polyptrichum commune</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.012 \pm 0.005	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Polyptrichum juniperinum</i>	0.132 \pm 0.101	0.042 \pm 0.020	0.156 \pm 0.070	0.140 \pm 0.099	0.554 \pm 0.209	0.198 \pm 0.071	0.070 \pm 0.028	0.064 \pm 0.028
<i>Polyptrichum piliferum</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.046 \pm 0.028	0.002 \pm 0.002	0.028 \pm 0.020	0.004 \pm 0.003	0.032 \pm 0.020	0.016 \pm 0.005
<i>Ptilium crista-castrensis</i>	0.366 \pm 0.301	0.136 \pm 0.084	0.072 \pm 0.044	0.130 \pm 0.058	1.144 \pm 0.801	0.126 \pm 0.058	0.530 \pm 0.357	0.166 \pm 0.115
<i>Sanionia uncinata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.124 \pm 0.068	0.000 \pm 0.000	0.324 \pm 0.132	0.000 \pm 0.000	0.408 \pm 0.230	0.000 \pm 0.000	0.062 \pm 0.034	0.000 \pm 0.000
<i>Barbilophozia lycopodioides</i>	0.430 \pm 0.145	0.060 \pm 0.040	0.250 \pm 0.092	0.076 \pm 0.034	0.686 \pm 0.200	0.030 \pm 0.020	0.310 \pm 0.172	0.004 \pm 0.003
<i>Lophozia longidens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Lophozia ventricosa</i>	0.156 \pm 0.067	0.004 \pm 0.003	0.174 \pm 0.102	0.002 \pm 0.002	0.194 \pm 0.076	0.000 \pm 0.000	0.062 \pm 0.028	0.000 \pm 0.000
<i>Ptilidium ciliare</i>	0.652 \pm 0.413	0.208 \pm 0.200	0.412 \pm 0.142	0.086 \pm 0.063	1.172 \pm 0.595	0.188 \pm 0.117	0.168 \pm 0.092	0.042 \pm 0.040

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

Appendix 4.27 Pre- and post-harvest percent covers (\pm S.E.) of terrestrial bryophyte species for control sites of Stand 3.

	C1		C2		C3		C4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mosses:								
<i>Dicranum brevifolium</i>	0.382 \pm 0.217	1.080 \pm 0.318	0.002 \pm 0.002	0.880 \pm 0.607	0.000 \pm 0.000	0.468 \pm 0.146	0.028 \pm 0.020	0.564 \pm 0.411
<i>Dicranum fuscaceus</i>	3.448 \pm 0.867	2.212 \pm 0.800	2.222 \pm 0.648	1.814 \pm 0.372	1.900 \pm 0.397	1.436 \pm 0.531	2.310 \pm 0.827	1.588 \pm 0.630
<i>Dicranum polysetum</i>	0.102 \pm 0.043	0.102 \pm 0.059	0.126 \pm 0.054	0.146 \pm 0.070	0.508 \pm 0.320	0.164 \pm 0.082	0.120 \pm 0.102	0.022 \pm 0.020
<i>Dicranum sp.</i>	0.000 \pm 0.000	0.082 \pm 0.060	0.000 \pm 0.000	0.082 \pm 0.056	0.024 \pm 0.020	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000
<i>Dicranum undulatum</i>	0.020 \pm 0.020	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.060 \pm 0.060	0.360 \pm 0.305	0.000 \pm 0.000	0.200 \pm 0.164
<i>Hylacomium splendens</i>	0.800 \pm 0.800	1.024 \pm 1.000	2.296 \pm 1.043	1.392 \pm 0.667	0.044 \pm 0.028	0.106 \pm 0.071	1.728 \pm 1.237	1.424 \pm 1.018
<i>Pleurozium schreberi</i>	11.014 \pm 2.543	11.716 \pm 2.919	22.220 \pm 4.216	23.640 \pm 4.345	18.148 \pm 3.564	19.432 \pm 3.614	13.782 \pm 3.604	14.404 \pm 3.620
<i>Pohlia nutans</i>	1.952 \pm 0.428	2.682 \pm 0.590	2.104 \pm 0.653	2.452 \pm 0.996	0.698 \pm 0.196	0.866 \pm 0.182	0.962 \pm 0.231	1.616 \pm 0.363
<i>Polytrichum commune</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.114 \pm 0.071	0.004 \pm 0.003	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000
<i>Polytrichum juniperinum</i>	0.050 \pm 0.040	0.114 \pm 0.071	1.556 \pm 0.850	0.806 \pm 0.522	0.220 \pm 0.114	0.196 \pm 0.093	0.744 \pm 0.433	0.756 \pm 0.432
<i>Polytrichum piliferum</i>	0.046 \pm 0.040	0.066 \pm 0.060	0.124 \pm 0.084	0.124 \pm 0.074	0.004 \pm 0.003	0.004 \pm 0.003	0.514 \pm 0.337	0.634 \pm 0.503
<i>Ptilium crista-castrensis</i>	4.462 \pm 2.309	3.610 \pm 2.115	5.798 \pm 1.838	5.280 \pm 1.638	0.444 \pm 0.400	0.328 \pm 0.300	0.204 \pm 0.164	0.088 \pm 0.063
<i>Saionia uncinata</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.062 \pm 0.060	0.060 \pm 0.044
Liverworts:								
<i>Barbilophozia hatcheri</i>	0.100 \pm 0.100	0.000 \pm 0.000	0.020 \pm 0.020	0.062 \pm 0.044	0.782 \pm 0.292	0.626 \pm 0.344	0.048 \pm 0.028	0.044 \pm 0.040
<i>Barbilophozia lycopodioides</i>	0.002 \pm 0.002	0.228 \pm 0.128	0.374 \pm 0.155	0.292 \pm 0.131	0.504 \pm 0.204	1.304 \pm 0.329	0.378 \pm 0.132	0.534 \pm 0.156
<i>Lophozia longidens</i>	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.000 \pm 0.000	0.002 \pm 0.002	0.002 \pm 0.002	0.000 \pm 0.000
<i>Lophozia ventricosa</i>	0.092 \pm 0.033	0.010 \pm 0.004	0.084 \pm 0.063	0.060 \pm 0.060	0.212 \pm 0.073	0.052 \pm 0.040	0.012 \pm 0.005	0.052 \pm 0.040
<i>Platidium ciliare</i>	0.396 \pm 0.158	0.578 \pm 0.261	0.318 \pm 0.134	0.228 \pm 0.096	0.550 \pm 0.178	0.688 \pm 0.231	0.316 \pm 0.169	0.196 \pm 0.105

Note: Three decimal places are included to provide an indication of abundance for species with extremely low average percent covers.

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